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Control of Industrial VOC (Volatile Organic Compound) Emissions by Catalytic Incineration. Volume 3. Catalytic Incinerator Performance at Industrial Site C-1

Radian Corp., Durham, NC

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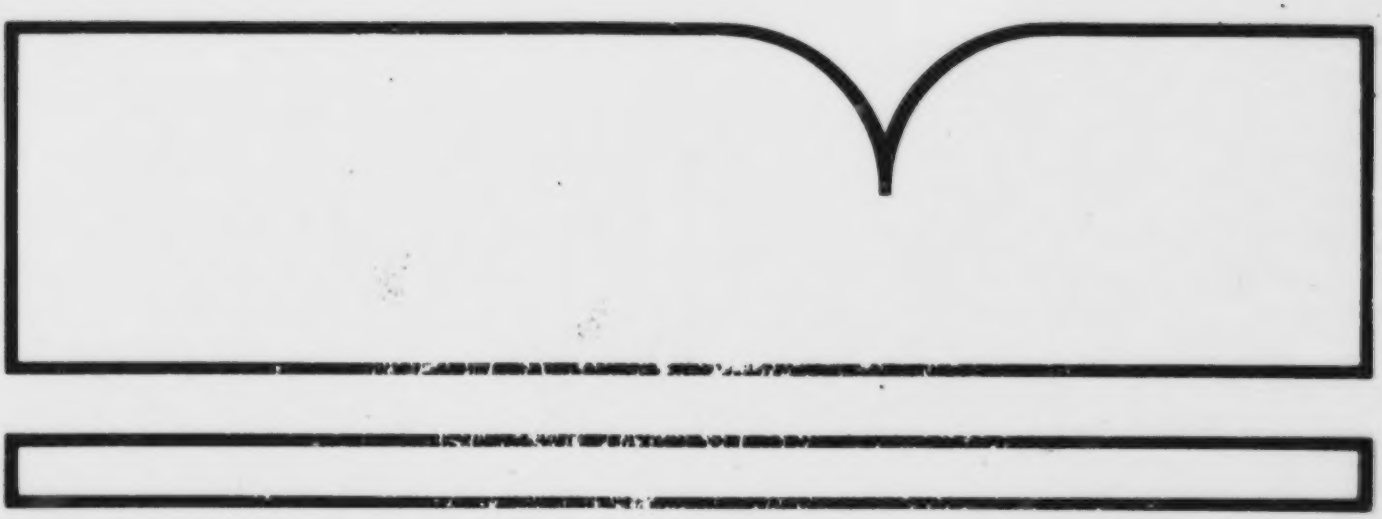

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CONTROL OF INDUSTRIAL VOC EMISSIONS BY CATALYTIC INCINERATION
Volume 3. Catalytic Incinerator Performance at Industrial Site C-1

by

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16. ABSTRACT The report is part of a two-phase EPA effort to assess the performance, suitability, and costs of various technologies to control emissions of volatile organic compounds (VOCs). In Phase 1, information was assembled from the literature on the use and cost of using catalytic incineration for VOC control. Results included: (1) a review of current and developing catalytic incineration technology, (2) an assessment of the overall performance of catalytic incinerators, (3) a review of applications where catalytic incinerators are used, (4) a comparative analysis of catalytic incineration with other competing VOC controls, (5) an examination of available methods for emission testing catalytic incinerators, and (6) an assessment of the need for additional performance test data. Phase 2 was a test program designed to increase the catalytic incinerator performance data base. It resulted in reports documenting the performance of eight catalytic incinerators at six industrial sites. The incinerators were used to control VOC emissions from solvent evaporation processes at can coating, coil coating, magnet wire, and graphic arts printing plants. Performance was measured at several process conditions at each site. Incinerator performance was characterized in terms of destruction efficiency, outlet solvent concentration, and energy usage. Design and operating data were collected.

17. KEY WORDS AND DOCUMENT ANALYSIS

a. DESCRIPTORS		b. IDENTIFIERS/OPEN ENDED TERMS	c. COSATI Field/Group	
Pollution	Magnet Wire	Pollution Control	13B	11F, 20C
Incinerators	Graphic Arts	Stationary Sources		14E
Catalysis	Printing Equipment	Catalytic Incineration	07D	
Organic Compounds		Volatile Organic Compounds	07C	
Volatility			20M	
Solvents		Solvent Evaporation	11K	
Evaporation		Can Coating		

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ABSTRACT

The emission of volatile organic compounds (VOCs) from industrial plants significantly increases ambient levels of photochemical oxidants, ozone, and smog. Control of industrial VOC emissions, therefore, can result in substantial environmental benefits. This study was part of a comprehensive effort by EPA/IERL-RTP to assess the performance, suitability and costs of various VOC control technologies. The objectives of the EPA program were two-fold:

(1) to provide an overview of how catalytic incineration is applied to control industrial VOC emissions and to assess the overall performance, applicability, and costs as compared to alternate VOC control technologies, and

(2) to gather actual performance data through a field testing program on existing operating industrial catalytic incinerators.

The task of meeting these objectives was accomplished in two phases. In the first phase, information was assembled from the literature on the use and cost of using catalytic incineration for VOC control. This phase of the study provides results in the following areas:

- A review of current and developing catalytic incineration technology,
- an assessment of the overall performance of catalytic incinerators,
- a review of applications where catalytic incinerators are used,
- a comparative analysis of catalytic incineration with other competing VOC controls,
- an examination of the available methods for emission testing catalytic incinerators, and
- an assessment of the need for additional performance test data.

The second phase was a testing program designed to increase the catalytic incinerator performance data base. The testing program was planned so that 8 catalytic incinerators at industrial sites would be tested.

The outputs from this phase of the program consisted of a series of reports documenting the performance of 8 catalytic incinerators at 6 industrial sites. All 8 incinerators were used to control VOC emissions from solvent evaporation processes. Incinerators at can coating, coil coating, magnet wire, and graphic arts printing plants were tested. The performance measurements were made at several process conditions at each of the sites visited. Incinerator performance was characterized in terms of destruction efficiency, outlet solvent concentration, and energy usage. Incinerator design and operating data, such as operating temperature, solvent type, catalyst volume and age, were collected to document the operating conditions during the tests.

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SECTION 1

INTRODUCTION

Radian Corporation is conducting a testing program for the EPA (Contract No. 68-02-3171, Work Assignment 50) to document the performance of catalytic incinerators applied to industrial processes for volatile organic compound (VOC) control. Performance data collected at each test site is being summarized in a series of test reports. A final report (Volume 2) presents a comparative analysis of data from all test sites. This report (Volume 3) presents test results for two incinerators at Plant C-1, a metal decorating plant.

VOC emissions are of concern to the EPA because they may react photochemically in the atmosphere to form photochemical oxidants. National Ambient Air Quality Standards (NAAQS) for photochemical oxidants are routinely exceeded in many areas of the United States. The objective of the current program is to gather performance data on industrial catalytic incinerators. This data will allow the EPA and industry to assess the potential reduction in VOC emissions that can be expected from using catalytic incinerators on various industrial processes. For purposes of discussion, the term VOC is used throughout this report to mean any volatile organic compound in the gas stream sampled.

The approach taken to evaluate the performance of industrial catalytic incinerators consisted of (1) developing plant-specific test plans and test methods to characterize incinerator performance and (2) performing several days of comprehensive on-site testing for each incinerator. Testing focused on the simultaneous monitoring of inlet and outlet VOC concentrations and measurement of incinerator operating conditions.

Incinerator destruction efficiencies presented in this report were determined by measuring inlet and outlet VOC concentrations according to EPA Method 25A. The Method 25A results represent total hydrocarbon (THC) concentrations in the gas streams on a carbon (C_1) basis. These THC values were determined by comparing the flame ionization detector (FID) response of the multicomponent gas streams sampled to the FID response of propane standards. The THC values represent a single FID response to a mixture of solvents and not the sum of responses to individual solvents in the mixture. The THC concentrations presented in this report cannot be compared to the percentages of individual components in the gas streams.

This report is divided into 4 sections beyond the introduction (Section 1.0). Section 2.0 provides a summary of the results of the test. Section 3.0 gives a detailed process description and Section 4.0 discusses the test methods used at the site. The results of testing and analysis are presented in Section 5.0.

SECTION 2

SUMMARY

Two catalytic incinerators at Plant C-1, a metal decorating plant, were performance tested in November 1982. Testing focused on characterizing incinerator performance in terms of destruction efficiency, energy usage and heat recovery rates. Results of the testing are summarized in this section.

The catalytic incinerators at Plant C-1 destroy solvents exhausted from drying ovens on metal coating lines. These coating lines produce decorated metal sheets. The coatings used at Plant C-1 are purchased pre-mixed and contain a wide range of solvents. Plant C-1 adds small amounts of solvents to the pre-mixed coatings, including methylisobutyl ketone (MIBK), mineral spirits, isophorone, diisobutyl ketone (DIBK) and butyl cellosolve.

The two incinerators tested at Plant C-1, incinerators 28 and 27, handle inlet solvent laden air (SLA) flowrates of approximately 3.8 m^3/s at 89°C and 4.6 m^3/s at 121°C (8000 acfm at 190°F and 9750 acfm at 250°F), respectively. The incinerators have catalyst beds containing catalyst coated ceramic honeycombs and are typically operated at an outlet temperature of 399°C (750°F).

During the 2-week test period at Plant C-1, incinerator performance was characterized for nine different coatings and three catalyst ages. Inlet and outlet VOC concentrations were monitored with total hydrocarbon (THC) analyzers and gas chromatographs (GC). The results of the THC analyses are summarized in Table 2-1.

The results shown in Table 2-1 indicate that incinerator destruction efficiency during normal process operation varied over a relatively narrow

TABLE 2-1. SUMMARIZED THC SAMPLING RESULTS

Incinerator	Catalyst Age (Months)	Product(s)	Range of Inlet THC Concentrations (ppmv)[b]	Range of Outlet THC Concentrations (ppmv)[b]	Range of Destruction Efficiencies (%)	Average Catalyst Bed Temperature Rise [°C(°F)]
28	23	A, B, C	2848 - 7809	173 - 321	93.9 - 95.9	122 (220)
28	0[c]	A, D, E, I, J	2317 - 5762	46 - 95	96.3 - 98.6	68 (122)
28	0[c]	L	2972 - 4142	186 - 341	91.8 - 93.4	167 (300)
27	8	K	4069 - 5827	181 - 275	95.1 - 96.4	61 (110)

[a]Data presented in this table are for normal process operating periods only.

[b]ppmv - parts per million by volume as carbon, quanitated against propane standards. Concentration ranges are for average values measured at inlet or outlet of incinerator during different monitoring periods on the product(s) noted.

[c]Catalyst was replaced on November 13, 1982.

range. The major factor affecting destruction efficiency at Plant C-1 was catalyst age or service life. With the exception of one product type (Product L), the newest catalyst showed the highest destruction efficiencies. These efficiencies ranged from 96.3 to 98.6 percent compared to 93.9 to 95.9 percent for a 23 month old catalyst and 95.1 to 96.4 percent for an 8 month old catalyst. The lower destruction efficiency for Product L is suspected to be due to (1) a lower catalyst bed inlet temperature, and (2) the presence of different solvents in this particular coating.

For similar products and incinerator operating temperatures, destruction efficiency also varied with inlet THC concentration. Destruction efficiencies for five different products tested on incinerator 28 increased from 96.4 to 98.6 percent for inlet THC concentrations ranging from 2520 to 6550 ppmv, respectively.

The average natural gas energy usage for the incinerators was approximately 3.5×10^9 J/hr (3.3×10^6 Btu/hr) for incinerator 27 and 2.7×10^9 J/hr (2.5×10^6 Btu/hr) for 28.

Outlet gas from the incinerators at Plant C-1 is recycled to the coating ovens and supplies heat needed to dry the coatings. Outlet gas recirculation averaged 53 percent for incinerator 27 and 34 percent for 28. Heat recovery for the two incinerators is estimated to range from 28 to 52 percent depending on the product being made.

SECTION 3

PROCESS DESCRIPTION

Plant C-1 produces decorated metal sheets and falls under SIC 3411, the metal can industry. Pigments or varnishes dissolved in solvents are applied to metal sheets in thin coats. The solvents are then driven off the metal sheets in drying ovens and the oven exhaust is ducted to a catalytic incinerator for solvent destruction. The plant operates 24 hours per day, 5 days per week.

The incinerators tested at Plant C-1, incinerators 27 and 28, are described in this section. A general description of the incinerators and their relationship to the metal decorating process is given in Section 3.1. Instrumentation used to monitor and control the incinerators is discussed in Section 3.2.

3.1 CATALYTIC INCINERATION PROCESS

Each catalytic incinerator tested at Plant C-1 is used to destroy solvent emissions from a single sheet metal coating line. Fugitive VOC emissions from a roll-type coating applicator are captured with a hood and ducted to the incinerator with the exhaust from three oven zones.

Coatings applied on lines 27 and 28 include both base coats and overvarnishes. The coatings are applied to protect the metal and to allow printing. No printing is performed on these two lines. Coatings used at Plant C-1 are purchased pre-mixed from coating manufacturers and are of unknown composition. However, major solvents identified in the coatings include methyl isobutyl ketone (MIBK), benzene, toluene, xylenes, ethyl benzenes and trimethyl benzenes. Solids contents of the coatings range from 19 to 41 percent as purchased. Plant C-1 adds small amounts of various

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solvents to the pre-mixed coatings, including MIBK, mineral spirits, isophorone, diisobutyl ketone (DIBK), and butyl cellosolve. These solvents are added to improve flow characteristics of the coatings during drying.

A schematic diagram of the relationship between each oven and incinerator at Plant C-1 is shown in Figure 3-1. Both incinerators tested have identical configurations.

As shown in Figure 3-1, solvent laden air (SLA) drawn from the oven by a large blower passes into the burner zone of the incinerator. The SLA is heated by the combustion of natural gas and then passes through the catalyst bed where solvents in the SLA are oxidized. Approximately 40 percent of the incinerator outlet gas, typically at 400°C (750°F), is recirculated to the three oven zones. Dampers control the amount of air recirculated to maintain a preset oven zone temperature. This zone temperature varies with the coating being dried. The rest of the incinerator outlet gas exhausts to the atmosphere via a stack.

Combustion air for the burner and makeup air for the SLA blower come from air in-leakage at the two ends of the oven and the fugitives hood. The rate of air in-leakage should be equivalent to the gas flowrate at the exhaust stack because the SLA blower draws a constant gas volume at steady state conditions.

The actual gas flowrate through the incinerators at Plant C-1 is relatively constant for different products. However, the inlet solvent mass flowrate and the solvent type vary from one product to the next.

The incinerators tested at Plant C-1 were designed and manufactured by DuPont and had a destruction efficiency guarantee of 90 percent. The catalyst in the incinerators is a catalyst coated ceramic honeycomb with the trade name Torvex^{R}. Each incinerator contains 12, 1 x 1 x 1 ft catalyst modules, giving a total catalyst volume of 0.33 m^3 (12 ft^3). For this

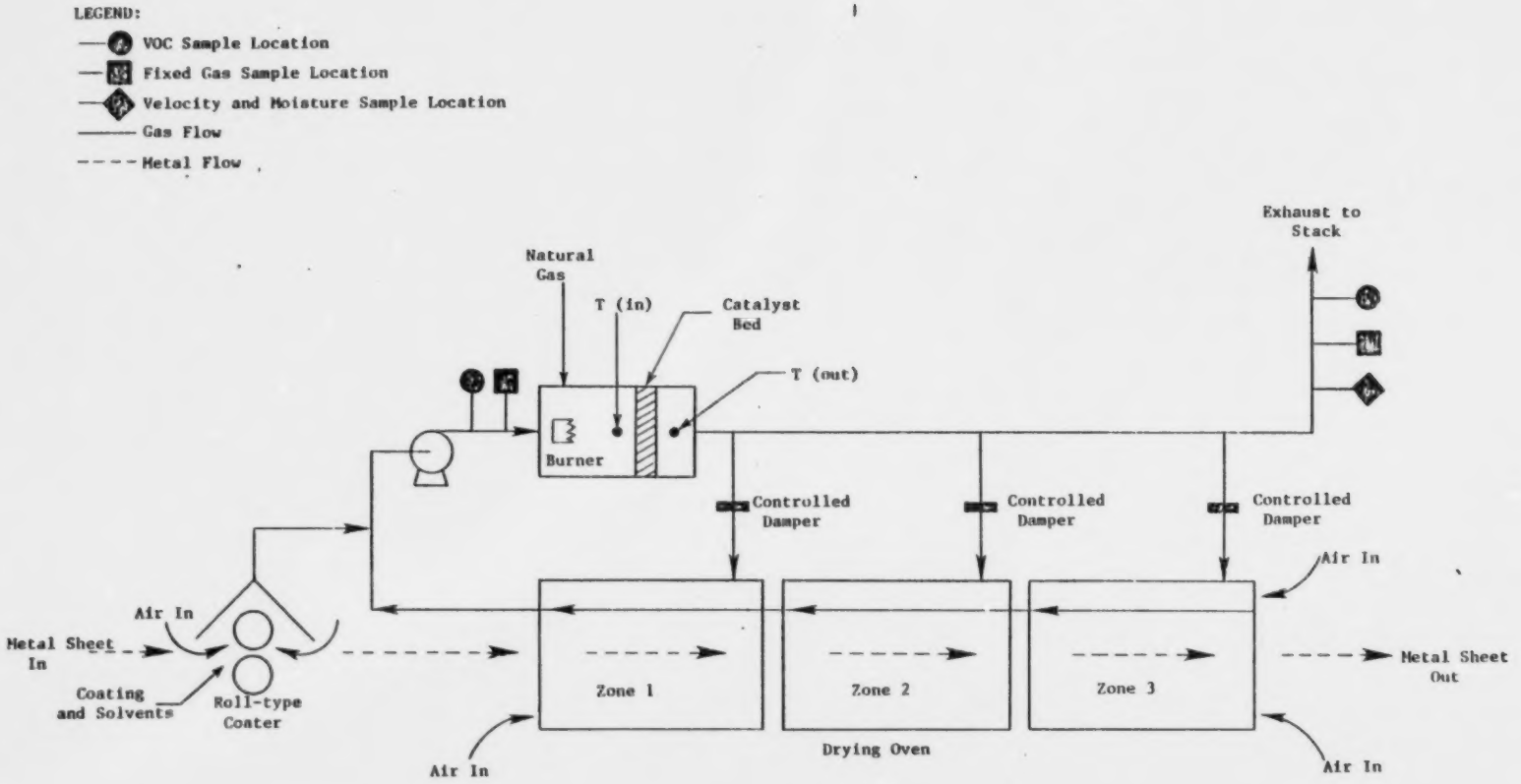

Figure 3-1. Process flow diagram for Plant C-1.

catalyst volume and a 60 percent void fraction, the residence time of the SLA in the catalyst bed is approximately 0.03 seconds. The total surface area of catalyst is approximately 299 m^2 (3216 ft^2).[1]

Incinerator 28 handles a SLA flowrate of approximately 3.8 m^3/s at 89°C (8000 acfm at 190°F) and incinerator 27 handles 4.6 m^3/s at 121°C (9,750 acfm at 250°F). Based on THC measurements, inlet solvent mass flowrates for the two incinerators ranged from 13 to 44 kg/hr (29 to 97 lb/hr), depending on the product being made. Actual solvent usage rates were not monitored during the testing.

Incinerator 28 was started up in December 1980 and the original catalyst was replaced on November 13, 1982. Incinerator 27 began operation in March 1982 and still had the original catalyst at the time of this testing.

3.2 INSTRUMENTATION AND CONTROLS

The incinerators at Plant C-1 are instrumented so that operation of the incinerator is fully automatic after system startup. The following instrumentation and controls are installed on the incinerator:

- a circular chart recorder indicating the gas temperature entering and exiting the catalyst bed,
- magnehelic gauges indicating pressure drop across the burners and the catalyst beds,
- a catalyst outlet temperature controller to maintain a minimum outlet temperature of 400°C (750°F),
- a catalyst inlet temperature controller to maintain a minimum catalyst inlet temperature of 260°C (500°F).

In addition, the incinerator is instrumented with a number of alarms to indicate fan failure and temperature excursions above 540°C (1000°F).

SECTION 3 REFERENCES

1. Du Pont Torvex® Ceramic Honeycomb Data Sheet. E.I. Du Pont de Nemours & Co., Wilminton, Delaware. May 1981.

SECTION 4

SAMPLING AND ANALYTICAL PROCEDURES

Testing procedures followed during the performance evaluation of the twp catalytic incinerators operated by Plant C-1 are presented in this section. Sampling procedures are discussed in Section 4.1 and analytical procedures are discussed in Section 4.2. Quality assurance/quality control procedures and results for Plant C-1 are discussed in the Quality Assurance Project Plan and Quality Assurance Report for this program (Volume 9).

4.1 SAMPLING PROCEDURES

This section describes the sampling methodology Radian used to characterize the operation and determine the VOC destruction efficiency of the Plant C-1 incinerators. EPA reference methods were typically used, however, some non-reference methods or modifications of reference methods were needed. The modifications are discussed in this section. A sampling procedure matrix is presented in Table 4-1.

4.1.1 Sample Acquisition for Fixed Gases and Volatile Organic Compounds

Both the incinerator inlet and outlet gas streams were continuously sampled throughout the test. A three-hole sampling rake was used to extract the gas sample from the main gas stream. As required by Method 25A specifications, the sampling rake had holes 3.2 mm (1.8 in) in diameter drilled in the tubing at a relative location of 16.7, 50 and 83.3 percent of the equivalent duct diameter. Sample gas passed through 1.8 m (6 ft.) of heat-traced stainless steel line before entering a heat-traced Teflon^{R} umbilical that carried it to the mobile laboratory. During transport

TABLE 4-1. SAMPLING PROCEDURES MATRIX

Parameter	Procedure
Fixed Gases and Volatile Organic Carbon (VOC) Content	EPA Method 25A
Gas Sample for GC/MS Analysis	Evacuated canister equipped with vacuum flow regulator
Moisture	EPA Method 4
Velocity/Volumetric Flow Rate	EPA Methods 1 and 2
Temperature	Thermocouple
Duct Pressure	Magnehelic® gauge or manometer
Other Process Data	Plant monitors or O&M records

through the umbilical from the duct to the laboratory, the sample gas was maintained at 100°C (212°F).

A manifold system inside the mobile laboratory was used to split the sample streams for analysis in two types of instruments, an organic species analyzer and a THC analyzer. After the heated gas passed through these instruments, it entered a set of impingers to knock out moisture and heavy organics. The cooled dry gas then proceeded through the Fisher Gas Analyzer before being vented.

The location of the sampling pump during the period from November 11 to November 20 was different from the pump location during the latter stages of the testing period. In the early part of the test (November 11-20) the sample pump was located downstream of the analytical instruments. A schematic of this sampling installation is shown in Figure 4-1. The residence time of the gas sample in the inlet heat transit sample line was 5 minutes and in the outlet line was 15 minutes with this arrangement. After reviewing the data, the testing crew decided that a shorter residence time in the sample umbilical would produce a better comparison of the actual inlet and outlet VOC conditions. Therefore, a new pumping arrangement was initiated for all tests after November 20. This arrangement consisted of heated (205°C, 400°F) sampling pumps installed upstream of the umbilicals. This arrangement resulted in a positive pressure and a 20 second residence time in both inlet and outlet sampling lines. A schematic of this sampling arrangement is shown in Figure 4-2.

4.1.2 Acquisition of Organic Species for GC/MS Analysis

Samples for GC/MS analysis were acquired at the outlet of the sample acquisition system using evacuated canisters. The canisters were cleaned, evacuated, and the absolute pressure recorded before sampling. Immediately prior to sampling, canister pressure was remeasured to ensure that no leakage had occurred. Flow regulators were used to provide a constant flow

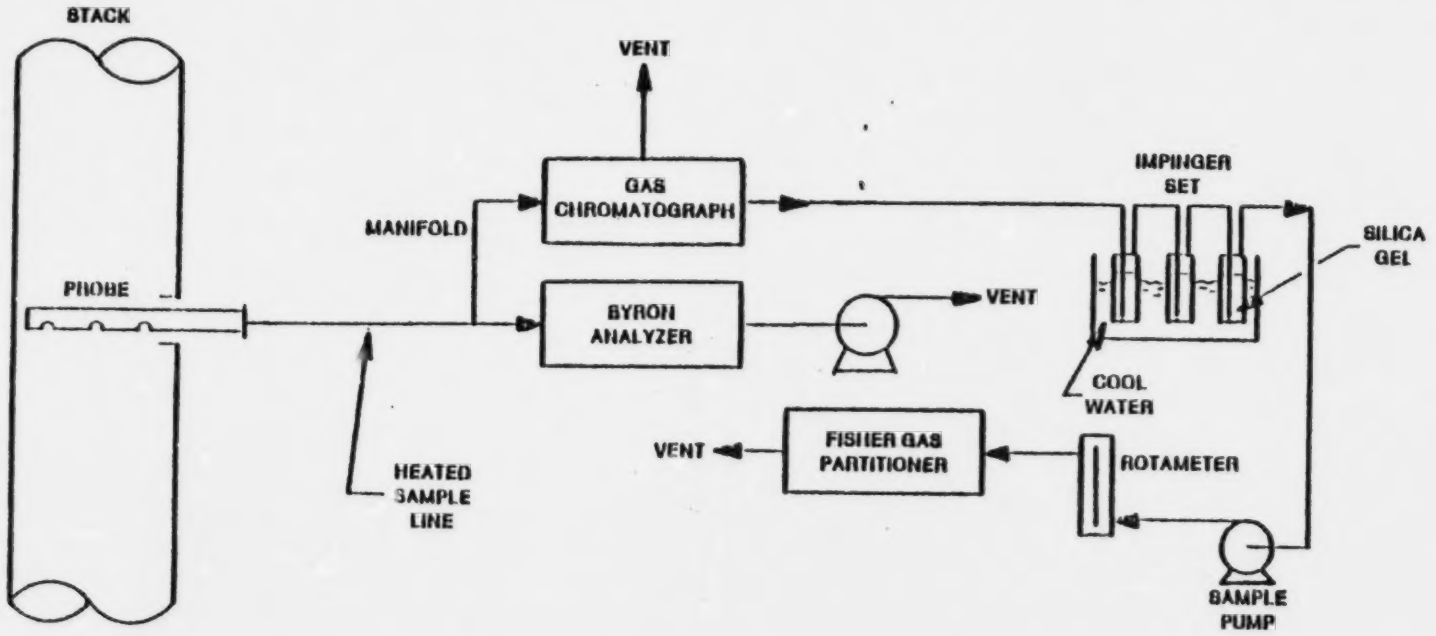

Figure 4-1. Negative pressure gas sampling system.

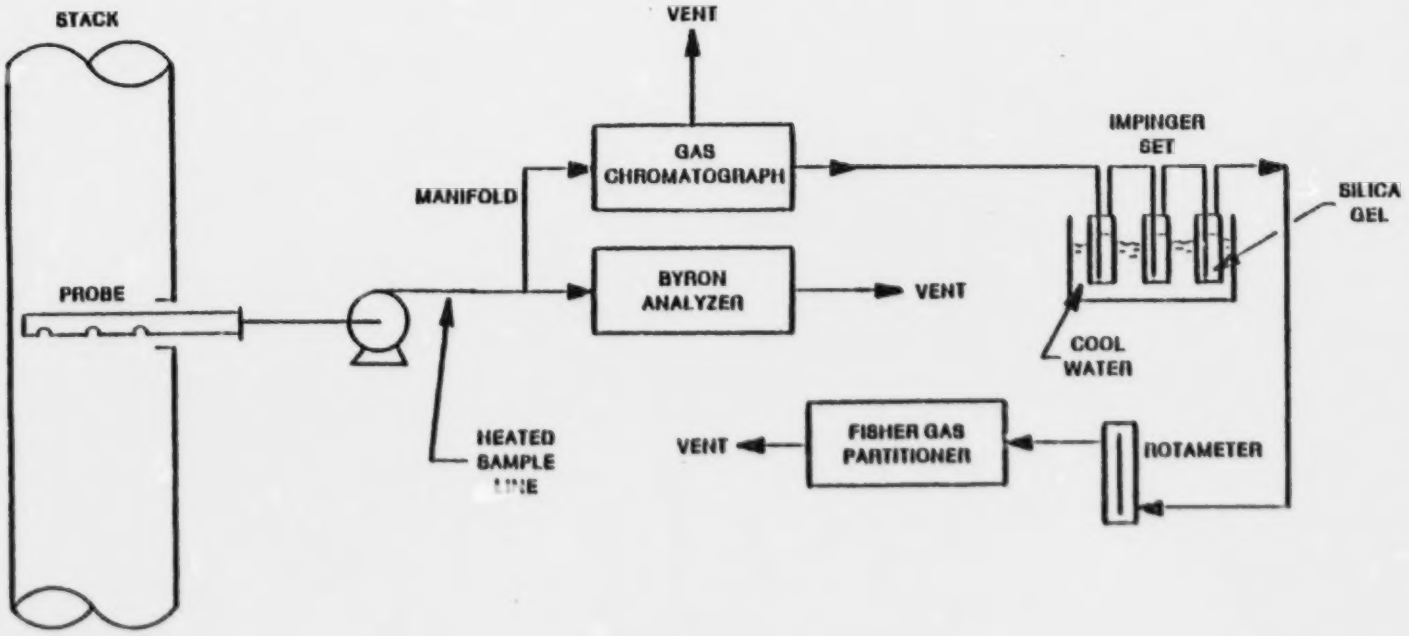

Figure 4-2. Positive pressure gas sampling system.

over the 20-minute sampling period. The flow regulators and canisters were attached to the sample acquisition system between the last impinger (with silica gel) and next to last impinger (empty).

After sample collection was completed, the canister input valves were closed and the canisters were disconnected from the sample line. Then absolute canister pressure was again measured. Prior to shipment, all canister valves were tightened and stem nuts sealed with Swagelok® plugs. When received at Radian's laboratory, canister pressure was remeasured to ensure no leakage had occurred. The canisters were then pressurized with UHP N_2 to 10-15 psig to provide pressure for removing the sample.

4.1.3 Moisture Determination

The moisture content of the incinerator exhaust stream was determined using the methodology prescribed in EPA Method 4. Based on this method, a measured volume of particulate-free gas is pulled through a chilled impinger train. The quantity of water condensed in the impingers is determined gravimetrically and then related to the volume of gas sampled to determine the moisture content. Figure 4-3 graphically illustrates the sampling train which is used for moisture determination.

4.1.4 Volumetric Gas Flow Rate Determination

The volumetric gas flow rate of the portion of the incinerator exhaust that exited to the atmosphere was measured using procedures described in EPA Method 2. As prescribed by this method, the volumetric gas flow rate was determined by measuring the cross-sectional area of the duct or stack and the average velocity of the flue gas. The average gas velocity was calculated from the average gas velocity pressure (ΔP), the average flue gas temperature, wet molecular weight, and the absolute pressure in the stack. Temperature and ΔP profiles were obtained by traversing the stack. As required by EPA Method 1, twelve traverse points in each of two sample ports

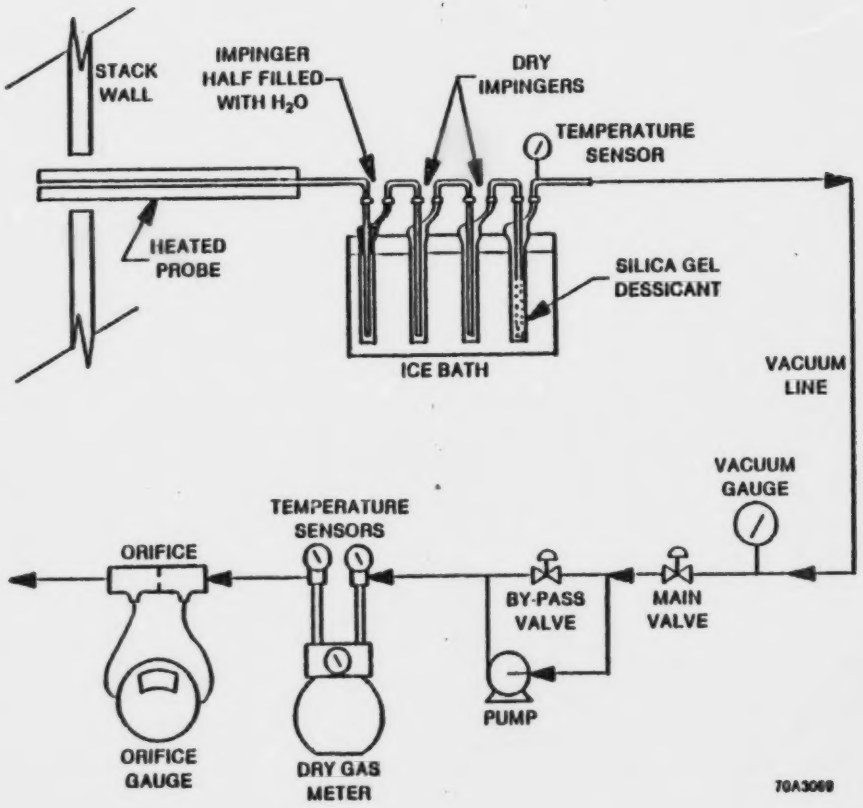

Figure 4-3. EPA Method 4 moisture train.

were used to determine the average gas velocity. This number of sampling points and their distance from the stack wall was determined based on the proximity of the sampling location to its nearest upstream and downstream flow disturbance.

Temperature profile and ΔP data were collected at each of the sampling points using a K-type thermocouple and an S-type pitot tube. A gauge oil manometer was used to measure the pressure drop (ΔP) across the S-type pitot. The daily barometric pressure was obtained from a local weather station and corrected for elevation. The static gas pressure at the incinerator inlet and outlet was be measured by disconnecting one side of the S-type pitot and rotating it so it was perpendicular to the gas flow. A gauge oil manometer was used to measure the static pressure at this point in the duct.

The volumetric gas flowrate at the incinerator inlet and outlet could not be measured according to EPA Method 2 because no acceptable sampling location was available. The incinerators were located in close proximity to the drying ovens and the ducts that returned the hot incinerator gases to the process were located too close to the incinerator outlet to provide a sufficient run of undisturbed duct. Because of this difficulty, the incinerator flows had to be estimated by performing a mass balance on CO_2 and total mass around the solvent laden air fan. This calculation required the results of fixed gas analyses and stack gas flowrate measurements. Details of the calculation are given in Appendix A.

4.1.5 Process Data

In addition to VOC concentrations, stream molecular weights and volumetric flow rates, several process parameters were determined or obtained at various points in the incinerator. These parameters included pressure drops across each stage of the system, intermediate temperature, and combustion air and fuel parameters. These additional parameters and the methods which

were used for their quantitation are presented in Table 4-2. In many instances, these data were obtained from the plant.

4.2 ANALYTICAL PROCEDURES

This section details the analytical methodology Radian used to characterize operational conditions and to measure the VOC destruction efficiency of the Plant C-1 incinerators. EPA reference methods were used where applicable. Any non-reference method or modifications of reference methods are discussed in this section. An analytical methods matrix is presented in Table 4-3.

4.2.1 Determination of VOC Concentrations

On-site VOC determinations were accomplished using two methods, EPA Method 25A and the draft Method 18. The first method uses flame ionization detection (FID) to provide total hydrocarbon (THC) concentrations. Similarly, the second method also uses an FID for quantification; however, the various organic species in the gas sample are chromatographically speciated prior to detection.

4.2.1.1 EPA Method 25A--

Method 25A specifies that THC determinations be performed using a continuous monitor equipped with an FID. Although an FID was used on this project, monitoring was performed on a semi-continuous basis using two Byron THC analyzers, one connected to the incinerator inlet sampling manifold and one to the outlet.

A Byron 301 THC analyzer was used to measure inlet THC concentrations. The Byron Model 301 Hydrocarbon Analyzer is a non-specific process gas chromatograph (GC) utilizing a flame ionization detector (FID) system to quantitatively determine methane (CH_4) and non-methane hydrocarbons in the vapor phase. Zero grade air and hydrogen are used for the flame while zero

TABLE 4-2. ADDITIONAL INCINERATOR PROCESS PARAMETERS FOR PERFORMANCE EVALUATION

Stream	Parameter	Test Method
Incinerator Auxiliary Fuel	Type	Plant Data
	Composition	Plant Data
	Heating Value	Plant Data
	Rate	Plant Data
Combustion Air	Rate	Plant Data
Exhaust Gas or Stack Incinerator	Velocity Profile	EPA Methods 1, 2, 3[a] and 4
	Temperature Profile	
Heat Recovery Data	Inlet/Outlet Temperatures	Thermocouple

[a]Fisher Gas Partitioner, Model 1200, was used as an equivalent method of determining molecular weight.

TABLE 4-3. ANALYTICAL PROCEDURES MATRIX

Parameter to be Measured	Method
VOC Concentration	EPA Method 25A Draft EPA Method 18 GC/MS Analysis
Fixed Gases (Molecular Weight)	Gas Chromatography (Thermal Conductivity Detection)
Moisture	EPA Method 4
Velocity/Volumetric Flow Rate[a]	EPA Methods 1 and 2
Temperature[a]	Thermocouple
Pressure[a]	Magnehelic® Gauge or Manometer
Other Process Data[a]	Plant Monitors or O&M Records

[a]Discussed in detail in Sections 4.1.4 and 4.1.5.

grade air is the GC column carrier gas. The analyzer contains sufficient hardware to provide sample valve and column valve switching at pre-set times. The instrument used for this testing was set to take a sample every three-minutes.

At the beginning of a cycle, an internal contact closure allows the pressure in the sample loop to equilibrate to atmospheric pressure. Twelve seconds into the cycle, the sample inject valve actuates. Gas in the sample loop is swept into a stripper column where CH_4 is separated from other organic compounds. After the CH_4 elutes from the column and passes through the detector, the non-methane hydrocarbons (NMHC) are backflushed out of the column and through the detector. Figure 4-4 is a schematic flow diagram of the Byron 301 instrument which shows the sample path through the instrument.

The electronics in the instrument provide fixed time peak detection windows, auto zeroing and peak integration capabilities. For six seconds after each peak window opens, the detector signal is monitored and auto zeroing occurs. During the remainder of each peak window, the detector signal is amplified and passed to a storage capacitor to accumulate the total charge from the detector. The amplified signal is continuously monitored with a strip chart recorder. At the end of the peak window, a signal representing the integrated area of the peak (the accumulated charge) is transferred to a capicator. This charge is used as the input to a computer data acquisition system and remains there until completion of the peak window for the next cycle.

Panel controls on the Byron 301 allow for a VOC range selection of 2 to 20,000 ppm, amplifier gain settings over a wide range, and detector zeroing. The gain setting potentiometers allow calibration of the instrument to provide any specified area value for the standard. For example, a 100 ppm standard can be analyzed to yield an integrated area corresponding to a 100 percent of the full-scale attenuation. In this case, calibration

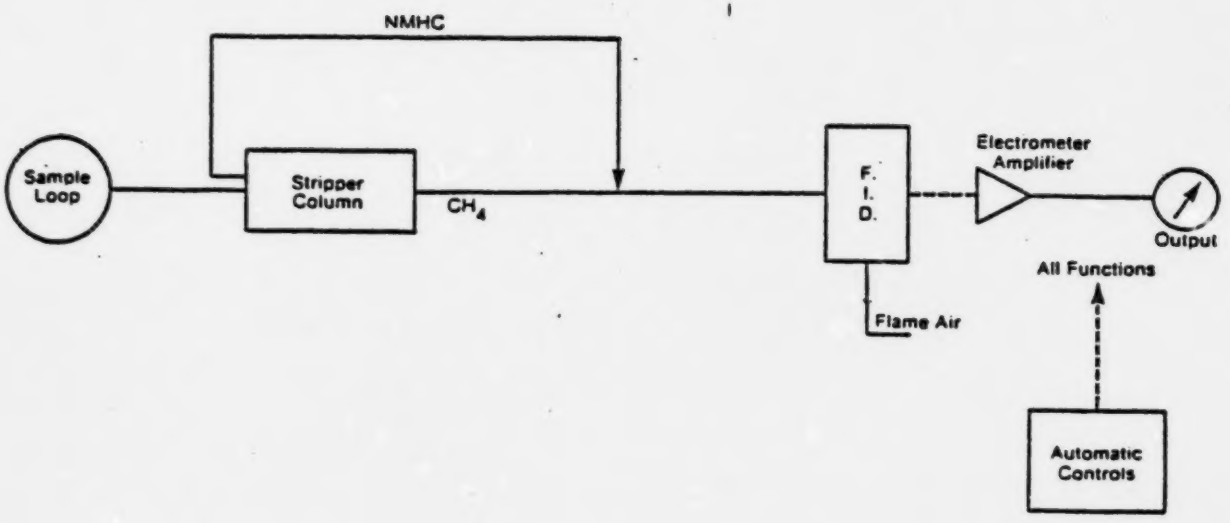

Figure 4-4. Schematic diagram of Byron 301 sample path.

represents a convenient way to determine accurate hydrocarbon concentrations over the full-scale range, i.e., an area of 100 would represent 100 ppm, an area of 50 would represent 50 ppm, and so on.

A Byron 401 was used to measure THC and carbon monoxide (CO) in the incinerator outlet stream. The Byron Model 401 Total Emissions Analyzer is similar in many respects to the model 301 described in the above section. The 401 has the additional capability of analyzing a sample stream for total hydrocarbons (THC), nonmethane hydrocarbons, carbon dioxide (CO_2), methane, and carbon monoxide (CO). The instrument was operated mostly in the THC mode because the one minute cycle time allowed measurement of relatively rapid concentration changes. The full scan mode was operated for brief periods to obtain measurements of CO and CH_4 in the outlet gas.

At the beginning of a THC cycle, contact closure occurs to allow the sample loop to equilibrate to atmospheric pressure. After 12 seconds, a sample is injected and flows directly into the FID. Electronic measurement of this peak and its area proceeds as described above for the Byron 301. The cycle repeats after one minute. Figure 4-5 is a schematic flow diagram of the Byron 401 that indicates the sample path through the instrument. Both the THC sample mode and the full scan mode are shown.

In the full scan mode, the cycle time is 12 minutes. The gas sample introduced into the 401 is ultimately separated into five groups of compounds:

- total hydrocarbons,
- C_3+ hydrocarbons,
- carbon monoxide (CO) and methane (CH_4),
- carbon dioxide (CO_2), and
- the C_2 hydrocarbon group.

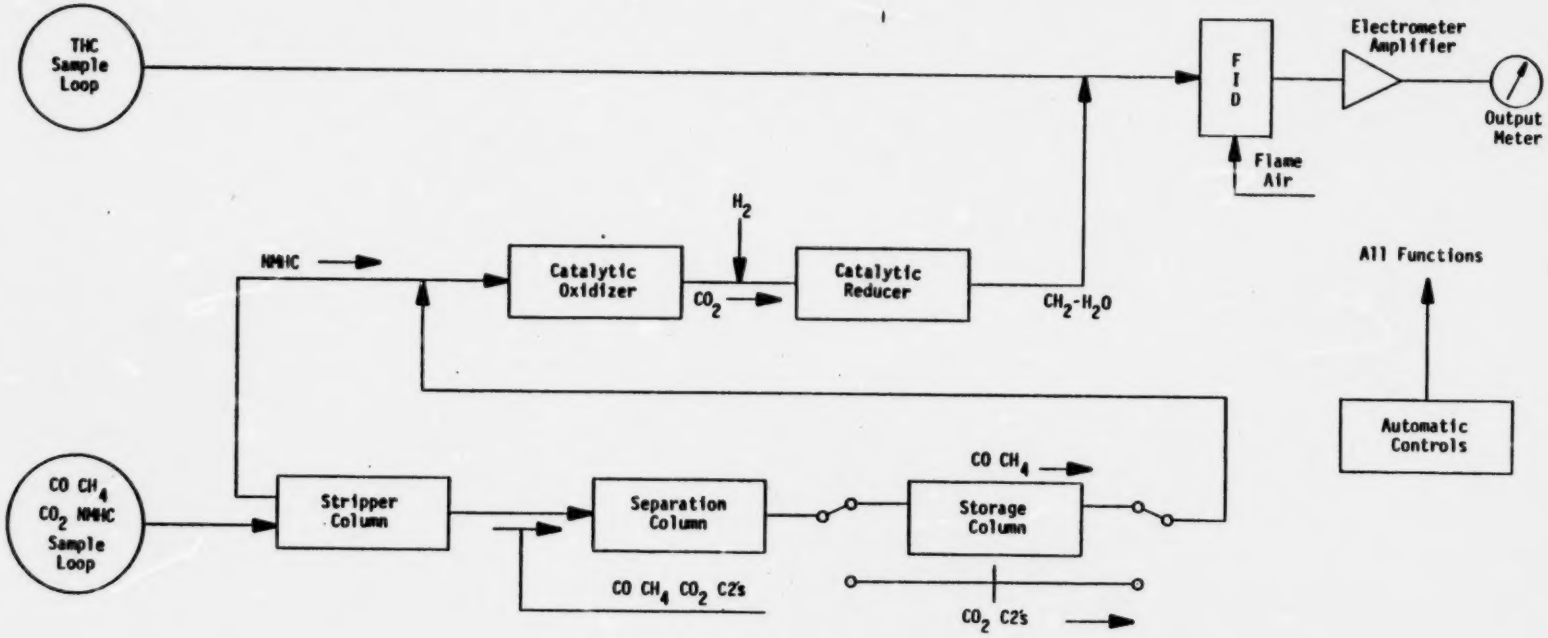

Figure 4-5. Schematic Diagram of Byron 401 Sample Path.

In operation the full scan cycle proceeds by first stripping the C_3+ group out of the sample contained in the sample loop. This is done using a chromatographic column which retains C_3+ compounds while allowing the remainder to pass through to a separation column. Meanwhile, the separation column separates the balance of the sample into the remaining three groups. CO and CH_4 emerging from the separator are retained on a 5A molecular sieve storage column while the CO_2 and C_2 groups are eluted. CO and CH_4 are then resolved and follow the same path to the FID where they are measured separately as CH_4.

All data from the Byron instruments was automatically recorded, stored on disk, and reduced using an Apple® II minicomputer. The computer also recorded the date and time of analysis, instrument, and sampling location. As a backup to the minicomputer data acquisition system, integrated areas of the peaks generated by each instrument were recorded using a strip chart recorder.

4.2.1.2 Method 18--

The draft Method 18 differs from Method 25A in that sample acquisition may be performed either by direct interface or by grab sampling. In addition, the organic species content in the stream is chromatographically speciated prior to detection by FID.

The draft Method 18 provides for the individual quantitation of organic species by gas chromatography using a flame ionization detector (FID). These analyses were performed on the same sample gas used for Method 25A. Analyses were performed simultaneously with the Method 25A analyses whenever possible. The gas sample was introduced into a fixed volume sample loop on an oven-mounted, 10-port stainless steel valve. After the loop was flushed with at least a 100-fold volume of sample, the gas flow was stopped and the loop was allowed to come to atmospheric pressure. The valve was then switched to the inject position. The instruments and analytical conditions used were:

- Instruments:	Tracor Model 560 (inlet) Hewlett-Packard Model 5730A (outlet)
- Column:	6 ft. x 1/8 od s.s., Poropak Q^R, 50/80 mesh
- Carrier Gas:	Nitrogen, 30 mL/min
- Temperature Program:	150°C for 3 min, 10°C/min to 250°C, 250°C until elution is complete
- Injection:	5 mL fixed volume loops
- Backflush:	At the completion of the chromatographic run to quantitate heavier organics as C_6^+

4.2.1.3 GC-MS Method--

Organic species were identified by GC/MS analysis of 20-minute, integrated samples taken in evacuated canisters. This system allows the identification of low molecular weight organics in the inlet and exhaust streams. The GC/MS uses a cryogenic trap to isolate sample components. The analytical conditions are summarized in Table 4-4. The cryogenic trapping system which was used is microprocessor controlled with air actuated valves to maximize analytical reproducibility.

4.2.2 Determination of Fixed Gases (Molecular Weight)

The dry (M_d) and wet (M_w) molecular weight of the incinerator inlet and exhaust streams were determined by a modified version of EPA Method 3. Rather than collecting integrated or grab samples of the gas stream, the umbilical and manifold system described in Section 3.1.1 was used to acquire samples for fixed gas (CO_2, O_2, and N_2) analyses.

A Fisher Model 1200 Gas Partitioner was used for fixed gas analysis. This instrument employed a 0.25 ml sample loop, dual columns and dual thermal conducitivity (TC) detectors. When the gas sample was introduced from the loop, it was first carried into Column 1. This column held up

TABLE 4-4. GC-MS CONDITIONS FOR ANALYSIS OF CANISTER SAMPLES

GC-MS Conditions	
Instrument	Hewlett-Packard Model 5982
Ionization voltage	70 eV
Scan rate	1 scan/sec
Scan range	10-200 amu
Column	25 meter DB-5 Fused Silica wide bore thick film
Initial temperature	-50°C
Program rate	16°C/min
Final temperature	280°C
Interface	Open split coupled
Trap Conditions	
Cryogenic trap temperature	-183°C
Desorption temperature	190°C
Desorption time	>10 min

CO_2 while the rest of the sample passed quickly through the column to the first TC detector producing a composite peak. The CO_2 then eluted from Column 1 and was detected by the first TC detector. This peak was used for CO_2 quantitation. The early eluting composite and the CO_2 then passed into Column 2 where the CO_2 fraction was permanently adsorbed while the remaining portion of the original sample was chromatographically separated into its components. These separated components eluted from Column 2 to be individually detected by the second TC detector. The operating parameters for the analysis were:

- Column 1: 1/8" x 6.5' aluminum packed with 80-100 mesh Columnpak PQ.
- Column 2: 3/16" x 11" aluminum packed with 60-80 mesh Molecular Sieve 13x.
- Oven temperature: 50°C
- Bridge Current: 225 mA
- Carrier Gas: 8.5% H_2 in He at 30 cc/min.

The dry molecular weight of the inlet/exhaust gas was calculated based on the concentrations of the fixed gases and converted to a wet basis using the Method 4 moisture data.

4.2.3 Determination of Moisture Content

The moisture content of the incinerator inlet and exhaust streams was determined using the methodology described in EPA Method 4. By this method, a measured volume of particulate-free gas is pulled through a chilled impinger train. The quantity of water condensed in the impingers is determined gravimetrically and then related to the volume of gas sampled to determine the moisture content.

REFERENCES

1. EPA Proposed Method 25A, "Determination of Total Gaseous Organic Concentration Using a Flame Ionization Analyzer," Proposed Revision to Appendix A 40 CFR, Federal Register, Volume 45, Number 194, December 17, 1980. pp. 83149-83151.

2. EPA Draft Method 18, "Measurement of Gaseous Organic Compound Emissions by Gas Chromatography," Personal communication with Jeff Chappell, U.S. Environmental Protection Agency, IERL-RTP.

3. EPA Reference Method 3, "Gas Analysis for Carbon Dioxide, Oxygen, Excess Air, and Dry Molecular Weight," Appendix A to 40 CFR, Environmental Reporter, Bureau of National Affairs, Washington, D.C., December 5, 1980. pp. 33-36.

4. EPA Reference Method 4, "Determination of Moisture Content in Stack Gases," Appendix A to 40 CFR, Environmental Reporter, Bureau of National Affairs, Washington, D.C., December 5, 1980. pp. 36-41.

5. EPA Reference Method 2, "Determination of Stack Gas Velocity and Volumetric Flow Rate (Type S Pitot Tube), Appendix A to 40 CFR, Environmental Reporter, Bureau of National Affairs, Washington, D.C., December 5, 1980. pp. 25-33.

SECTION 5

RESULTS OF TESTING AND ANALYSIS

The catalytic incinerators at Plant C-1 were tested from November 11 through November 24, 1982. Data collected on the incinerators showed a relatively narrow range of destruction efficiencies, 92 to 99 percent, for a wide range of operating conditions. Catalyst age appears to be the major factor affecting performance. For similar products and operating conditions, the newest catalyst showed average destruction efficiencies between 96.3 and 98.7 percent while the oldest catalyst showed efficiencies between 93.0 and 95.9 percent. Other variables having a lesser affect on performance appear to be inlet total hydrocarbon (THC) concentration, incinerator operating temperature and product type.

The results of the testing conducted at Plant C-1 are presented in this section. Operating parameters and Method 25A sampling results are discussed in Sections 5.1 and 5.2, respectively. The results of Method 18 and GC/MS analyses are discussed in Section 5.3.

5.1 OPERATING PARAMETERS

The operating conditions and parameters measured or recorded during the testing are discussed in this section. The age of the catalyst beds tested at Plant C-1 will be discussed first. This discussion will be followed by a presentation of data collected on incinerator operating conditions. Process shutdowns and startups that occurred during the testing will be discussed last.

The catalyst beds tested at Plant C-1 ranged in age from new to approximately 2 years. The original catalyst in incinerator 28 was in operation

from December 1980 until November 13, 1982. Test data was collected on the 23 month-old catalyst in this incinerator on November 12 and 13. All other test data collected on incinerator 28 was with the new catalyst. The catalyst bed in incinerator 27 was approximately 8 months old, having been in operation since March 1982.

Data collected on operating conditions of incinerators 27 and 28 are shown in Tables 5-1 and 5-2 respectively. The data include gas temperatures, stack gas and SLA flowrates, stack gas moisture contents and incinerator energy consumption.

The catalyst inlet and outlet temperatures shown in Table 5-1 and 5-2 were taken from the plant strip chart recorders. Fan energy consumption was determined using an ammeter and the natural gas usage was measured using existing gas meters on each incinerator.

The inlet gas flowrates shown in Tables 5-1 and 5-2 were calculated by performing a mass balance for carbon dioxide (CO_2) and total air mass around the SLA blower. This calculation required gas analysis for CO_2 before and after the SLA blower and measurement of the exhaust stack gas flowrate according to EPA Method 2. The calculation assumes that the exhaust stack gas flowrate minus the natural gas flowrate is equivalent to the amount of air in-leakage that occurs at the two ends of the oven and at the fugitives hood (Figure 3-1). An example of the calculation is presented in Appendix A.

Comparison of the data shown in Tables 5-1 and 5-2 shows that the operating conditions of the two incinerators are similar. However, both the electrical and natural gas energy usage are more than 30 percent higher for incinerator 27 compared to 28. This higher energy usage is partially the result of the higher gas flow handled by incinerator 27.

TABLE 5-1. SUMMARY OF OPERATING PARAMETERS FOR INCINERATOR 27.

Parameter	Average Value	Range
Catalyst inlet temperature[a]	363°C (685°F)	338-393°C (640-730°F)
Catalyst outlet temperature[a]	396°C (745°F)	393-407°C (740-765°F)
Inlet SLA flowrate[b]	3.4 Nm^3/s (7250 dscfm)	--
Inlet SLA temperature	121°C (250°F)	--
Inlet SLA static pressure	1.1 kPa (4.3 in H_2O)	--
Stack gas flowrate[c]	1.66 Nm^3/s (3530 dscfm)	1.54-2.89 Nm^3/s (3270-6120 dscfm)
Stack gas temperature[c]	375°C (707°F)	362-393°C (683-740°F)
Stack gas moisture content[c]	4.5%	3.6-5.1%
Catalyst bed pressure drop[a]	0.60 kPa (2.4 in H_2O)	0.57-0.64 kPa (2.30-2.55 in H_2O)
Burner pressure drop[d]	0.27 kPa (1.1 in H_2O)	--
Natural gas usage[e]	0.018 m^3/s (39 cfm)	--
Natural gas energy usage[f]	3.5×10^9 J/hr (3.3×10^6 Btu/hr)	--
Fan energy usage[g]	11.9 kW	--
Percentage of outlet gas recirculated[h]	53%	18-56%

[a] From plant instrumentation.

[b] Calculated from mass balance of CO2 around SLA fan (see Appendix A).

[c] For roof stack venting to atmosphere. Volumetric flowrate, moisture content and molecular weight results are summarized in Appendix B.

[d] Based on plant data.

[e] From natural gas meter during testing.

[f] Based on gas pressure of 5 psig and heating value of 1050 Btu/scf.

[g] Measured by ammeter.

[h] Based on stack gas flowrate and inlet SLA flowrate.

TABLE 5-2. SUMMARY OF OPERATING PARAMETERS FOR INCINERATOR 28.

Parameter	Average Value	Range
Catalyst inlet temperature[a]	316°C (600°F)	266-384°C (510-660°F)
Catalyst outlet temperature[a]	410°C (770°F)	396-457°C (745-855°F)
Inlet SLA flowrate[b]	3.1 m^3/s (6500 dscfm)	--
Inlet SLA temperature	89°C (190°F)	--
Inlet SLA static pressure	0.87 kPa (3.5 in H_2O)	--
Stack gas flowrate[c]	1.80 Nm^3/s (3810 dscfm)	1.57-2.02 Nm^3/s (3320-4290 dscfm)
Stack gas temperature[c]	331°C (628°F)	3.61-441°C (681-826°F)
Stack gas moisture content	4.1%	3.4-4.8%
Catalyst bed pressure drop[a]	0.57 kPa (2.3 in H_2O)	0.55-0.59 kPa (2.20-2.35 in H_2O)
Burner pressure drop[d]	0.27 kPa (1.1 in H_2O)	--
Natural gas usage[e]	0.014 m^3/s (30 cfm)	0.010-0.021 m^3/s (22-44 cfm)
Natural gas energy usage[f]	2.7 x 10^9 J/hr (2.5 x 10^6 Btu/hr)	--
Fan energy usage[g]	7.9 kW	--
Percentage of outlet gas recirculated[h]	34%	26-43%

[a]From plant instrumentation.

[b]Calculated from mass balance of CO2 around SLA fan (see Appendix A).

[c]For roof stack venting to atmosphere. Volumetric flowrate, moisture content and molecular weight results are summarized in Appendix C.

[d]Based on plant data.

[e]From natural gas meter during testing. Long-term plant data shows 0.011-0.012 m^3/s (24-26 cfm).

[f]Based on gas pressure of 5 psig and heating value of 1050 Btu/scf.

[g]Measured by ammeter.

[h]Based on stack gas flowrate and inlet SLA flowrate.

During testing at Plant C-1, data were collected on 13 different products. These products are identified in this report as Products A through M. Test periods during which data were collected during normal process operation are presented in Table 5-3.

Process shutdowns and startups at Plant C-1 generally occurred for one of three reasons, employee breaks, shift changes and product changeovers. Periods during which product changeovers occurred during sampling are shown in Table 5-3. Changeovers from one product to another usually took about 1 hour but ranged from 45 to 75 minutes. Process shutdowns for shift changes and employee breaks are not shown in Table 5-3. These shutdowns lasted from 15 to 30 minutes and occurred every 2 hours beginning at 7:30 AM with the start of the first shift.

During normal working periods, the coating line ran continuously. Stacks of metal sheets were run through the coaters in batches at a rate of about 15 to 20 minutes per batch. A short break of 2 to 4 minutes occurred between batches while the next stack of metal was set up. The production rate of the coating lines ranges from 80 to 100 sheets per minute.

5.2 METHOD 25A SAMPLING RESULTS

The results of the Method 25A sampling conducted at Plant C-1 are presented in this section. The Method 25A or THC concentrations presented in this section are expressed as carbon, but were quanitated against propane standards. The destruction efficiencies were calculated from measured inlet and outlet THC concentrations unless otherwise noted. The incinerator destruction efficiencies are essentially equivalent to those that would be calculated on a solvent mass basis since the incinerator inlet and outlet gas mass flowrates are the same except for the addition of natural gas at the burner. The natural gas flowrate causes less than a 1 percent increase in the total gas flow entering the incinerator. An example calculation of destruction efficiency is given in Appendix C.

TABLE 5-3. PRODUCTS MADE DURING VOC SAMPLING AT PLANT C-1

Date	Time	Incinerator	Product ID	Type Of VOC Sampling	Process Status
11/12/82	09:00 - 14:00	28	A	Byron/GC	Normal Operation
	21:24 - 22:30	28	-	Byron	Change to Product B
11/13/82	22:31 - 02:33	28	B	Byron	Normal Operation
	02:34 - 03:21	28	-	Byron	Change to Product C
	03:22 - 06:42	28	C	Byron	Normal Operation
11/15/82	19:36 - 21:11	28	-	Byron	Change to Product D
	21:12 - 21:42	28	D	Byron/GC	Normal Operation
	21:43 - 23:18	28	D	Byron	Unsteady Operation
11/16/82	00:47 - 02:05	28	D	Byron/GC	Unsteady Operation
	02:06 - 03:35	28	D	Byron	Normal Operation
	03:36 - 04:38	28	-	Byron	Change to Product E
	04:39 - 06:57	28	E	Byron	Normal Operation
	13:03 - 14:03	27	F	Byron	Unsteady Operation
	14:04 - 16:55	27	F	Byron	Normal Operation
11/17/82	20:46 - 03:22	27	F	Byron	Normal Operation
	03:23 - 05:15	27	-	Byron	Change to Product G
	05:16 - 09:07	27	G	Byron	Normal Operation
	16:20 - 17:30	28	M	GC	Unsteady Operation
11/18/82	19:00 - 23:00	28	H	GC	Normal Operation

TABLE 5-3. PRODUCTS MADE DURING VOC SAMPLING AT PLANT C-1 (CONTINUED)

Date	Time	Incinerator	Product ID	Type Of VOC Sampling	Process Status
11/19/82	00:23 - 00:56	28	-	Byron/GC	Change to Product I
	00:57 - 03:50	28	I	Byron	Normal Operation
	03:51 - 04:20	28	-	Byron	Change to Product J
	09:13 - 11:33	28	J	Byron/GC	Normal Operation
	11:33 - 12:30	28	J	Byron	Unsteady Operation
	13:17 - 14:21	28	-	Byron	Change to Product A
	14:22 - 15:50	28	A	Byron/GC	Normal Operation
	20:04 - 20:21	27	K	Byron/GC	Unsteady Operation
	20:22 - 20:50	27	K	Byron/GC	Normal Operation
11/20/82	22:36 - 05:52	27	K	Byron	Normal Operation
11/22/82	07:12 - 08:23	27	K	Byron	Normal Operation
	09:34 - 11:31	27	K	Byron/GC	Normal Operation
	12:22 - 19:48	27	K	Byron/GC	Normal Operation
	20:12 - 20:30	27	K	Byron	Unsteady Operation
11/23/82	20:52 - 06:01	27	K	Byron	Normal Operation
	06:09 - 07:42	28	K	Byron	Normal Operation
	18:25 - 20:01	28	L	Byron/GC	Normal Operation
	20:22 - 23:18	28	L	Byron	Normal Operation
11/24/82	00:47 - 07:35	28	L	Byron/GC	Normal Operation

5.2.1 Summary of Method 25A Results

The results of Method 25A (total hydrocarbon) analyses for incinerators 28 and 27 are presented in Tables 5-4 and 5-5. Over 30 hours of incinerator performance data are presented for each incinerator. The monitoring period and the length of the monitoring period is identified in the tables.

All of the monitoring periods shown in Tables 5-3 and 5-4 represent normal process operation unless otherwise noted. Process shutdowns and startups for regular employee breaks have been included in the VOC destruction efficiencies since these breaks are a part of normal Plant C-1 operation.

Data collected during product changeovers has not been included in Tables 5-4 and 5-5. During these periods inlet THC concentrations were usually below the detection limit of the instrument, which was approximately 120 ppmv. Periods during which coating line problems caused unsteady process operation have been treated as separate monitoring periods. These periods are appropriately identified in Tables 5-4 and 5-5.

The product being made on each coating line during the test periods and the solvents added to the particular coating are also shown in Tables 5-4 and 5-5. As discussed in Section 3.1, the exact composition of the solvents in the pre-mixed coatings is not available.

Destruction efficiencies measured for incinerator 28 with the 23 month old catalyst (Products A, B and C) ranged from 93.0 to 95.9 percent. The new catalyst achieved higher efficiencies ranging from 96.3 to 98.7 percent for all products except Product L. The higher efficiencies obtained for the new catalyst indicate that the 23 month old catalyst was, as expected, partially deactivated. The only product tested with both the old and new catalyst was Product A. With the new catalyst, the destruction efficiency measured for Product A was approximately 3 percent higher than for the old catalyst.

TABLE 5-4. SUMMARY OF METHOD 25A SAMPLING RESULTS FOR INCINERATOR 27.

Date	Monitoring Period	Length of Monitoring Period (minutes)	Product ID	Solvents Added To Coating[c]	Inlet Method 25A Concentrations (ppmv)[a]	Outlet Method 25A Concentration (ppmv)[a]	Average Destruction Efficiency (%)[b]	Average Gas Temperature °C (°F) Catalyst Inlet	Catalyst Outlet	Outlet CO (ppmv)
11/16/82	13:03-14:04	62	F	mineral spirits	1366[d]	e	NA	393 (730)	393 (740)	-
11/16/82	14:05-16:55	171	F	mineral spirits	1767	e	NA	393 (730)	393 (740)	-
11/16/82 - 11/17/82	20:44-03:22	399	F	mineral spirits	2220	e	NA	374 (705)	407 (765)	-
11/17/82	05:14-09:07	234	G	50% mineral spirits 30% isophorone 20% DIBK	3356	e	NA	374 (705)	404 (760)	-
11/19/82	20:04-20:21	18	K	butyl cellosolve	1796[d]	197	89.0[d]	388 (730)	393 (740)	-
11/19/82- 11/20/82	22:35-05:52	438	K	butyl cellosolve	4069	181	95.6	357 (675)	396 (745)	-
11/22/82	07:12-08:23	72	K	butyl cellosolve	2158[f]	235	89.1[f]	354 (670)	399 (750)	-
11/22/82	09:32-11:31	120	K	butyl cellosolve	5827	212	96.4	338 (640)	399 (750)	13
11/22/82	12:22-19:48	447	K	butyl cellosolve	4460	205	95.4	343 (650)	393 (740)	-
11/22/82 - 11/23/82	20:50-06:01	552	K	butyl cellosolve	4964	225	95.5	343 (650)	393 (740)	-
11/23/82	06:09-07:42	96	K	butyl cellosolve	5582	275	95.1	341 (645)	393 (740)	10

[a] ppmv = parts per million as C_1, quantitated against propane.

[b] Destruction Efficiency = $\frac{Vin - Vout}{Vin}$ X 100% where, V= THC concentration (in or out), ppmv.

[c] These solvents are added in small amounts to pre-mixed coatings purchased by Plant C-1. DIBK = diisobutyl ketone, MIBK = methylisobutyl keytone.

[d] Process problems - unsteady operation.

[e] These data have been invalidated due to a suspected leak in the sample acquisition system. THC values measured on the Byron 401 were less than the inlet gas CH4 concentrations.

[f] These data were collected during process startup.

TABLE 5-5. SUMMARY OF METHOD 25A SAMPLING RESULTS FOR INCINERATOR 28.

Date	Monitoring Period	Length of Monitoring Period (minutes)	Product ID	Solvents Added To Coating[a]	Inlet Method 25A Concentrations (ppmv)[a]	Outlet Method 25A Concentration (ppmv)[a]	Average Destruction Efficiency (%)[b]	Average Gas Temperature °C (°F) Catalyst Inlet	Catalyst Outlet	Outlet CO (ppmv)
11/12/82	20:03-21:09	24[d]	A	butyl cellosolve	4053[e]	201	93.0	282 (540)	402 (755)	-
11/12/82 - 11/13/82	22:31-02:33	243	B	50% mineral spirits 50% butyl cellosolve	2848	173	93.9	313 (595)	399 (750)	-
11/13/82	03:22-06:42	201	C	80% mineral spirits 20% isophorone	7809	321	95.9	296 (565)	457 (855)	-
11/15/82	21:10-21:42	33	D	mineral spirits	2400	89	96.3	346 (655)	396 (745)	-
11/15/82	22:58-23:18	21	D	mineral spirits	685[f]	51	92.6[f]	332 (630)	404 (760)	-
11/16/82	00:48-02:05	78	D	mineral spirits	777[f]	44	94.3[f]	327 (620)	399 (750)	-
11/16/82	02:06-03:35	90	D	mineral spirits	2803	95	96.6	329 (625)	396 (745)	-
11/16/82	04:39-06:57	141	E	mineral spirits	2293	65	97.2	332 (630)	396 (745)	-
11/19/82	00:57-03:50	174	I	DIBK[c]	2317	58	97.5	344 (651)	399 (750)	-
11/19/82	04:21-08:08	228	J	mineral spirits	3161	68	97.8	324 (615)	399 (750)	-
11/19/82	09:24-10:59	96	J	mineral spirits	3095	68	97.8	321 (610)	398 (750)	3
11/19/82	11:31-12:30	60	J	mineral spirits	1498[d]	34	97.7[d]	349 (660)	396 (745)	1
11/19/82	14:22-15:24	63	A	butyl cellosolve	5762	84	98.5	308 (585)	407 (760)	-
11/19/82	15:51-16:38	48	A	butyl cellosolve	3409	46	98.7	349 (660)	402 (755)	-
11/23/82	18:24-20:01	98	L	MIBK[c]	4142[g]	341	91.8	266 (510)	452 (845)	-
11/23/82	20:22-23:18	177	L	MIBK	2972[g]	186	93.7	279 (535)	438 (820)	-
11/24/82	00:47-07:35	409	L	MIBK	4124[g]	274	93.4	285 (545)	429 (805)	-

[a] ppmv = parts per million as C_1, quantitated against propane. NMHC = non-methane hydrocarbons, THC = total hydrocarbons.

[b] Destruction Efficiency = $\frac{Vin - Vout}{Vin} \times 100\%$ where, V= THC concentration (in or out), ppmv

[c] These solvents are added in small amounts to pre-mixed coatings purchased by Plant C-1. DIBK = diisobutyl ketone, MIBK = methyl-isobutyl keytone.

[d] Extended process down time not included in this period.

[e] Three of eight inlet data points for this period exceeded full-scale value of 5145 ppmv.

[f] Process problems - unsteady operation.

[g] Several inlet data points exceeded full-scale value of 12140 ppmv during this period.

For Product L, the average destruction efficiency for 11 hours of testing was 93.2 percent. This efficiency is considerably lower than that measured for the other five products tested with the new catalyst, Products D, E, I, J, and A. The incinerator operating conditions measured for Product L differ slightly in that the catalyst inlet temperature is between 22 and 64°C (40 and 115°F) lower than for the other products. The results of GC and GC/MS analyses (Section 5.3) both indicate that the coating for Product L had a different solvent composition than the other products. The Product L coating contained a larger fraction of solvents with a molecular weight greater than that of hexane. These two differences, the lower catalyst inlet temperature and the different solvent composition, are suspected to have resulted in the lower efficiency measured for Product L.

Destruction efficiencies measured for incinerator 27 varied over a very narrow range, from 95.1 to 96.4 percent. All of the available data for incinerator 27 is on Product K. This is the primary product made on this coating line. Outlet concentrations for Products F and G on November 16 and 17 were invalidated because of a temporary leak in the outlet VOC sample acquisition system.

As shown in Table 5-4, inlet THC concentrations measured during normal operation of incinerator 28 ranged from 2293 to 7809 ppmv, depending on the product being made. These inlet concentrations correspond to inlet mass flowrates ranging from 13 to 44 kg/hr (29 to 97 lb/hr). The inlet THC concentrations and mass flowrates shown in Table 5-5 for incinerator 27 fall within the same range as those measured on incinerator 28.

Tables 5-4 and 5-5 show that average catalyst outlet temperatures ranged between 393 and 407°C (740 and 765°F) except for Products C and L. Catalyst inlet temperatures varied somewhat for different product types and inlet concentrations. However, for similar products and inlet concentrations, such as Products D, E, I, J and A, the catalyst inlet temperatures varied over a fairly narrow range, from 321 to 349°C (610 to 660°F).

For Products C and L the outlet temperatures exceeded 427°C (800°F). The high outlet temperatures and comparatively low inlet temperatures shown in Table 5-4 for these two products are probably the result of higher inlet THC mass flowrates. The higher inlet mass flowrates caused a larger temperature rise across the catalyst because a greater weight of solvent is oxidized in the catalyst bed.

Carbon monoxide (CO) concentrations on the outlet of the incinerators were measured for several short periods during the testing and the results are shown in Tables 5-4 and 5-5. All of the average CO concentrations measured were below 15 ppmv. These low values indicate relatively complete oxidation of any CO formed during the oxidation of solvents in the catalyst bed or during combustion of natural gas in the burner zone.

5.2.2 Results of Parametric Analyses

The results of three parametric analyses are presented in this section. The effect of inlet THC concentration on destruction efficiency is discussed first followed by the effect of the mass of solvent burned on catalyst bed temperature rise. Fuel requirements and heat recovery rates for the different products at Plant C-1 are discussed last.

All analyses included in this section were conducted with data for selected sampling periods where no process breaks occurred and the process was operated normally. Data used in the analyses presented in this section are shown in Table 5-6. All of the data are from incinerator 28. Incinerator 27 data were not included because the different gas flowrate and catalyst age for this incinerator made the data for Product K uncomparable.

5.2.2.1 Effect of Inlet Concentration on Destruction Efficiency

The effect of inlet THC concentration on destruction efficiency is shown in Figure 5-1 for Products A, D, E, I, and J. These products were selected

TABLE 5-6. SUMMARY OF INCINERATOR 28 RESULTS USED IN PARAMETRIC ANALYSES

Date	Start Time	Product ID	Inlet VOC Concentration (ppmv)	Outlet VOC Concentration (ppmv)	Destruction Efficiency (%)	Inlet VOC Mass Flowrate kg/hr (lb/hr)	Weight of Solvent Burned kg/hr (lb/hr)	Average Gas Temperatures °C (°F) Catalyst Inlet	Catalyst Outlet	ΔT
11/12/82	2345	B	3592	213	94.1	19.3 (42.6)	18.2 (40.1)	299 (570)	402 (755)	103 (185)
11/13/82	0430	C	12734	392	96.9	68.6 (151)	66.[illegible]	271 (520)	496 (925)	225 (405)
11/15/82	2112	D	2515	90	96.4	13.5 (29.8)	13.0 (28.7)	321 (610)	402 (755)	81 (145)
11/16/82	0441	E	2618	69	97.4	14.1 (31.0)	13.7 (30.2)	324 (615)	402 (755)	78 (140)
11/19/82	0117	I	3176	71	97.8	17.1 (37.6)	16.7 (36.8)	332 (630)	402 (755)	70 (125)
11/19/82	0432	J	3414	72	97.9	18.4 (40.5)	18.0 (39.6)	321 (610)	402 (755)	81 (145)
11/19/82	1432	A	6549	94	98.6	35.2 (77.6)	34.7 (76.5)	285 (545)	404 (760)	119 (215)
11/24/82	0159	L	4624	361	92.2	24.9 (54.8)	22.9 (50.5)	260 (500)	443 (830)	183 (330)

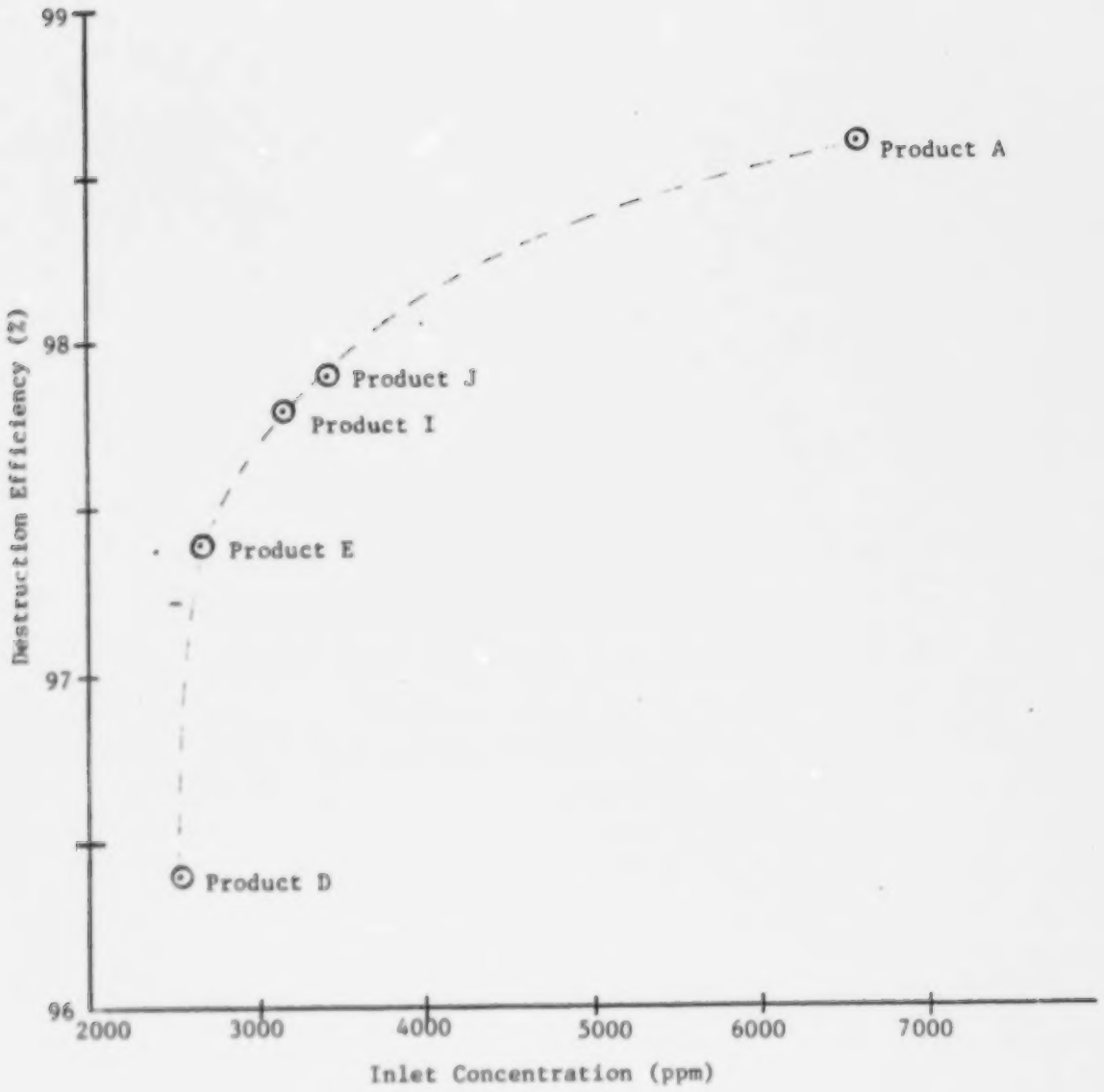

Figure 5-1. Destruction efficiency versus inlet concentration.

for this analysis because the GC results presented in Section 5.3.1 showed that the solvents in these coatings are similar and because all five products had similar catalyst bed operating temperatures.

As shown in Figure 5-1, the VOC destruction efficiency across the incinerator increases with increasing inlet concentration for similar products or coatings. The increase in efficiency appears to be greatest between 2000 and 4000 ppm and then tapers off at higher concentrations.

The increase in destruction efficiency with higher inlet concentrations is caused by an increase in the overall rate of reaction of the solvent and oxygen in the gas stream. The extent to which the rate of this reaction may be limited by the oxidation reaction occurring on the catalyst surface or the rate of mass transfer of solvent to the surface cannot be determined from the data available for Plant C-1.

5.2.2.2 Catalyst Bed Temperature Rise Versus Mass of Solvent Burned

The effect of the mass of solvent burned on catalyst bed temperature rise is shown in Figure 5-2. The mass of solvent burned shown in Figure 5-2 is the mass of solvent destroyed across the incinerator. As expected, Figure 5-2 shows an increase in catalyst bed temperature rise with an increase in mass of solvent burned.

The data points in Figure 5-2 for Products A, B, C, D, E, I and J all fall nearly on a straight line. However, Product L shows a relatively large temperature rise for a small mass of solvent being burned across the incinerator.

The larger temperature rise for Product L is difficult to explain with the data available. However, one plausible explanation is that a comparatively low solvent destruction occurs for this product in the burner zone of the incinerator. Based on the results of GC and GC/MS analyses presented in

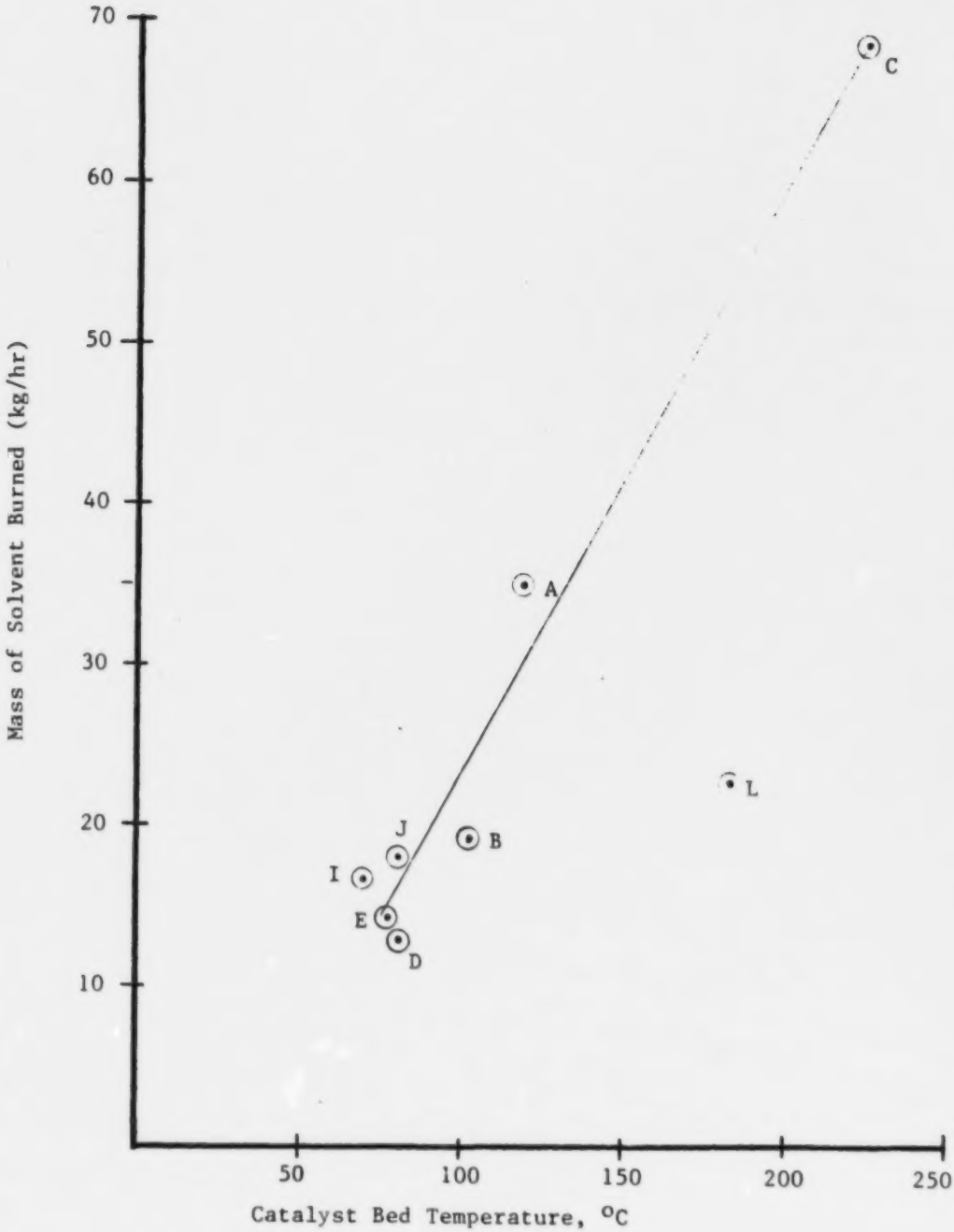

Figure 5-2. Solvent burned versus catalyst bed temperature rise.

Section 5.3, Product L contains a higher percentage of high molecular weight components than the other products tested. It is likely that these high molecular weight components are not destroyed as they pass through the burner. Instead most of the Product L solvent destruction occurs on the catalyst bed, causing a large temperature rise.

For products A, B, C, D, E, I and J, the lighter components in the solvent may actually be destroyed as the SLA passes through the burner zone. This would result in the comparatively lower temperature rise at the catalyst bed for a given amount of solvent destroyed across the incinerator. Solvent destruction in the burner zone for these products compared to Product L would be aided by the higher average gas temperature at the burner. No data are available on the relative destruction efficiencies that occur across the burner and the catalyst bed.

5.2.2.3 Fuel Requirement Range for Different Products

Incinerator natural gas usage and heat recovery are discussed in this section for two products and operating conditions. These two products and conditions bracket the range of natural gas requirements for the different products and two incinerators tested at Plant C-1. In general, incinerator natural gas requirements will be higher for higher waste gas flowrates and for operating conditions having the greatest temperature rise across the burner.

The natural gas requirements for Products K and L are shown in Table 5-7. As shown, the natural gas usage for Product K on incinerator 27 is approximately 27 percent higher than for Product L on incinerator 28. The fuel usage for Product K is higher for two reasons. First, incinerator 27 handles an approximately 11 percent higher gas flowrate than incinerator 27. This higher gas flowrate requires more fuel to heat the incinerator inlet gas to a given catalyst bed inlet temperature.

TABLE 5-7. FUEL REQUIREMENTS FOR PRODUCTS K AND L

Incinerator	Product ID	Average Gas Temperatures °C (°F) Burner Inlet	Catalyst Inlet	Catalyst Outlet	Burner ΔT	Natural Gas Usage m^3/s (cfm)	Natural Gas Energy Usage J/hr (Btu/hr)
28	L	88 (190)	260 (500)	443 (830)	172 (310)	0.014 (30)	2.7×10^9 (2.5×10^6)
27	K	121 (250)	335 (635)	393 (740)	196 (385)	0.018 (38)	3.4×10^9 (3.2×10^6)

The second reason for the higher fuel usage for Product K is the higher temperature rise across the burner zone of the incinerator. This temperature rise is primarily the result of natural gas combustion in the burner, although some solvent may also be destroyed in the burner.

Based on an energy balance using the energy usage data in Table 5-11 and stack gas flowrates presented in Tables 5-1 and 5-2, the rate of heat recovery for Products L and K is approximately 51 and 39 percent, respectively. This heat recovery rate was calculated as the percentage of heat generated by natural gas and solvent combustion that remains in the process and does not exit with the gas exhausted at the stack. An example of this calculation is presented in Appendix C.

5.2.3 Overall Process Destruction Efficiency

Two different destruction efficiencies can be defined for the process configuration at Plant C-1. The first efficiency is the destruction efficiency directly across the incinerator, which was discussed in Section 5.2.1. A second efficiency, an overall process destruction efficiency, can be defined as the percent of VOC entering the incinerator that is not vented to the atmosphere via the exhaust stack. This overall process efficiency could be equivalent to or higher than the incinerator destruction efficiency, depending on the amount of incinerator outlet gas recycled to the process. The overall process destruction efficiency as defined here is only an approximation of the percentage destruction of all VOC emitted from the coating process. No measure of actual solvent usage at the coater could be obtained during the testing nor could fugitive emissions be accounted for.

Outlet stack THC emission rates and overall process destruction efficiencies for incinerators 28 and 27 are shown in Tables 5-8 and 5-9. The inlet and outlet THC mass flowrates were calculated using the THC concentrations given in Table 5-4 and 5-5 and the average inlet and stack gas flowrates given in Tables 5-1 and 5-2.

TABLE 5-8. STACK EMISSION RATES AND OVERALL PROCESS THC DESTRUCTION EFFICIENCIES FOR INCINERATOR 28.[a]

Date	Monitoring Period	Product ID	Inlet THC Mass Flowrate[b] kg/hr	(lb/hr)	Outlet THC Stack Emission Rate kg/hr	(lb/hr)	Approximate Overall Process THC Destruction Efficiency (%)
11/12/82	20:03-21:09	A	23	(50)	0.68	(1.49)	97.0
11/12/82-11/13/82	22:31-02:03	B	16	(35)	0.59	(1.29)	96.3
11/13/82	03:22-06:42	C	44	(97)	1.10	(2.39)	97.5
11/15/82	21:10-21:42	D	14	(30)	0.30	(0.66)	97.8
11/15/82	22:58-23:18	D	4.1	(8.3)[c]	0.17	(0.38)	95.4[c]
11/16/82	00:48-02:05	D	4.4	(9.8)[c]	0.15	(0.33)	96.6[c]
11/16/82	02:06-03:35	D	16	(35)	0.32	(0.71)	98.0
11/16/82	04:39-06:57	E	13	(29)	0.23	(0.49)	98.3
11/19/82	00:57-03:50	I	13	(29)	0.20	(0.44)	98.5
11/19/82	04:21-08:08	J	18	(39)	0.23	(0.50)	98.7
11/19/82	09:24-10:59	J	17	(38)	0.23	(0.50)	98.7
11/19/82	11:31-12:30	J	8.3	(19)[c]	0.11	(0.26)	98.6[c]
11/19/82	14:22-15:24	A	33	(72)	0.29	(0.62)	99.1
11/19/82	15:51-16:38	A	19	(42)	0.16	(0.35)	99.2
11/23/82	18:24-20:01	L	23	(52)	1.15	(2.54)	95.1
11/23/82	20:22-23:18	L	17	(37)	0.63	(1.39)	96.2
11/24/82	00:47-07:35	L	23	(51)	0.92	(2.04)	96.0

[a]Based on Method 25A concentrations quantitated against propane.

[b]Inlet mass flowrate is at incinerator inlet.

[c]Data collected during unsteady process operation.

TABLE 5-9. STACK EMISSION RATES AND OVERALL PROCESS VOC DESTRUCTION EFFICIENCIES FOR INCINERATOR 27[a]

Date	Monitoring Period	Product ID	Inlet THC Mass Flowrate[b] kg/hr	(lb/hr)	Outlet THC Stack Emission Rate kg/hr	(lb/hr)	Approximate Overall Process THC Destruction Efficiency (%)
11/19/82	20:04-20:01	K	11	(24)[c]	0.62	(1.36)	94.3
1/19/82-11/20/82	22:35-05:52	K	26	(56)	0.56	(1.25)	97.8
11/22/82	07:12-08:23	K	14	(29)	0.74	(1.62)	94.5
11/22/82	09:32-11:31	K	37	(81)	0.67	(1.46)	98.2
11/22/82	12:22-19:48	K	28	(62)	0.64	(1.41)	97.7
1/22/82-11/23/82	20:50-06:01	K	32	(69)	0.71	(1.55)	97.8
11/23/82	06:09-07:42	K	35	(77)	0.86	(1.89)	97.6

[a]Based on Method 25A concentrations quanitated against propane.

[b]Inlet mass flowrate is at incinerator inlet.

[c]Data collected during unsteady process operation.

The destruction efficiencies shown in Tables 5-8 and 5-9 are higher than those shown in Tables 5-4 and 5-5 because a portion of the incinerator outlet gas is recirculated to the coating ovens. This recirculation results in a slight increase in the incinerator inlet concentration compared to an oven not using recirculation.

5.2.4 Selected Method 25A Sampling Results

Selected analysis results from Tables 5-4 and 5-5 are presented in Figures 5-3 and 5-4. The results presented in Figures 5-3 and 5- illustrate inlet and outlet THC concentration fluctuations on an instantaneous and long-term basis, respectively.

The data in Figure 5-3 is for incinerator 28 on Product L. The data illustrate corresponding fluctuations in the inlet and outlet THC concentrations, destruction efficiency and inlet and outlet catalyst bed temperatures during a normal 3-hour period.

The destruction efficiencies shown in Figure 5-3 only approximate instantaneous efficiencies because the inlet samples were taken every 3 minutes and outlet data points are the average of three 1 minute samples. The sharp drop in the destruction efficiency at 05:04 is probably due to the semicontinuous nature of the test method. Although the inlet and outlet hydrocarbon analyzers are synchronized in time as closely as possible, a momentary drop in the inlet concentration was detected by the inlet analyzer but no corresponding drop was detected at the outlet.

As shown in Figure 5-3, process fluctuations have a significant effect on the catalyst inlet and outlet temperatures. Process shutdowns result in a decrease in the outlet temperature and an increase in the inlet temperature. The effect of process fluctuations is more pronounced for Product L because the solvents in the coating cause a relatively large temperature rise across the catalyst. Other products tested at Plant C-1 showed much lower temperature rises as can be seen from the data in Tables 5-4 and 5-5.

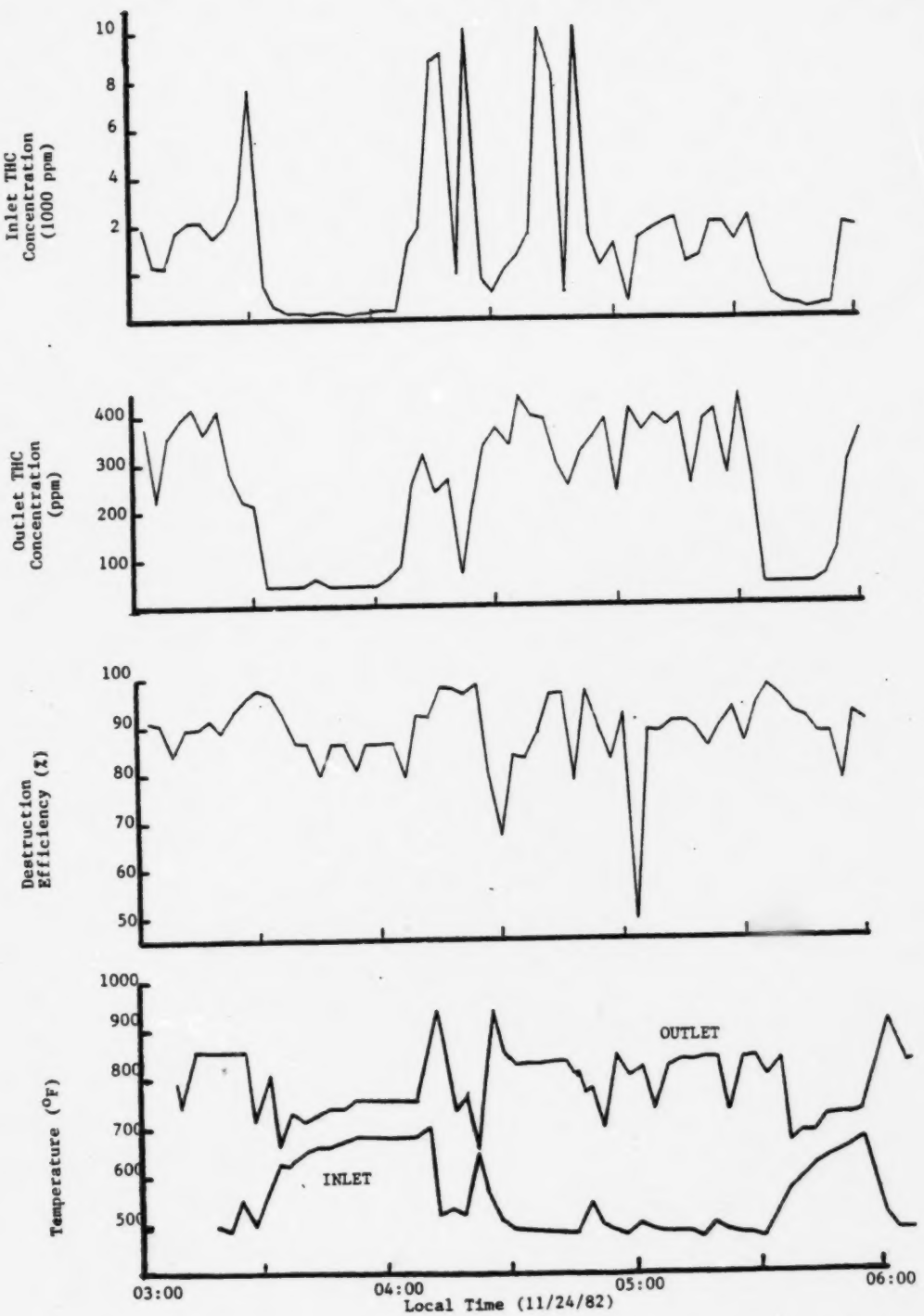

Figure 5-3. Operating period showing effect of process breaks.

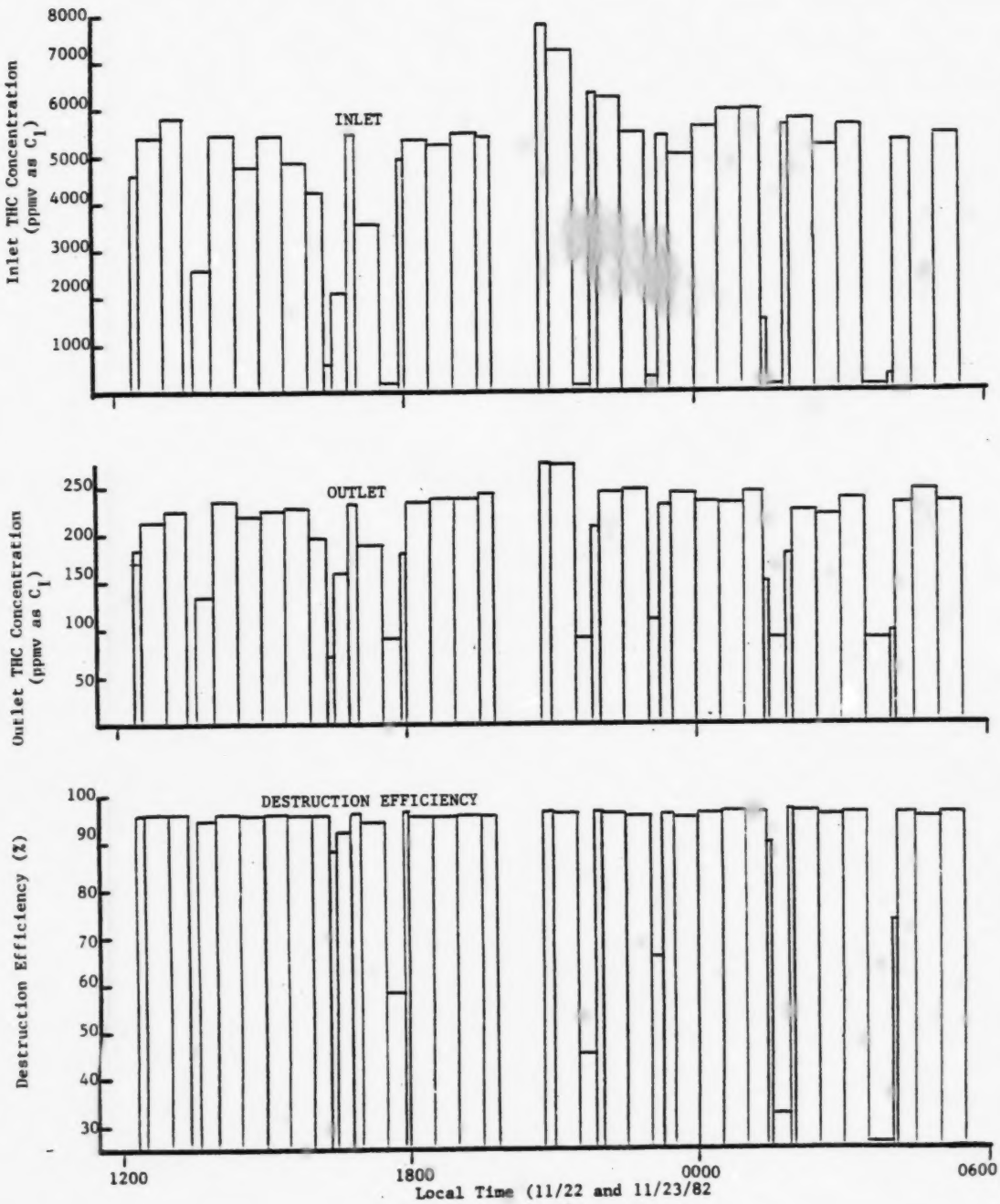

Figure 5-4. Continuous monitoring period on Incinerator 27.

The results presented in Figure 5-4 show a 15-hour sampling period for Product K on incinerator 27. Data are presented for the entire period except for approximately 1 hour. Figure 5-4 shows 30 minute averages for inlet and outlet THC concentrations and for destruction efficiency. In cases where the 30 minute average would have been biased by the occurrence of regular employee breaks, the 30 minute segment has been separated into two or three smaller segments.

As shown in Figure 5-4, the average destruction efficiency is very constant over the monitoring period. Efficiencies of less than 85 percent occurred for approximately 2 hours during 14 hours of sampling. These lower efficiencies occurred during regular process breaks. During normal process operating periods the destruction efficiency was over 85 percent and averaged 95.3 percent for the entire monitoring period.

5.3 RESULTS OF GC AND GC/MS ANALYSES

The results of on-site Method 18 gas chromatography (GC) and laboratory GC/mass spectrometry analyses are presented in this section. Samples of the incinerator inlet and outlet gas were analyzed using a GC to quantify individual organic species with molecular weights in the C_1 to C_6 range. Gas samples were collected in evacuated canisters for GC/MS analysis to identify organic species present in the gas stream.

5.3.1 Results of Method 18 Analyses

The results of GC analyses are summarized in Table 5-10. Average Method 18 concentrations and standard deviations are shown for compounds from C_1 through C_6 and for all compounds greater than C_6. Periods for which GC samples were inadvertently taken during unsteady process conditions are noted.

TABLE 5-10. SUMMARY OF GAS CHROMATOGRAPH ANALYSES

Date	Incinerator	Sample Location	Number of Samples	Average Method 18 concentration, ppmv C_1[a] (Standard Deviation) C_1	C_2	C_3	C_4	C_5	C_6	C_7[j]	Other C_6[+]	THC	Product	Solvent Added to Product
11/12/82	28	Inlet	2	30.3 (3.8)	ND[b]	ND	ND	32.7[c] (-)	145[c] (-)	NA[d]	3370 (354)	3578 (358)	A	Butyl cellosolve
11/12/82	28	Outlet	5	19.4[e] (4.2)	6.5 (0.2)	20.3 (2.7)	ND	13.4 (10.2)	73.5[c] (-)	87.8 (34.8)	129[e] (92)	350 (141)	A	Butyl cellosolve
11/15/82 11/16/82	28	Inlet	3	39.0 (3.4)	ND	ND	ND	10.6[f] (5.6)	232 (303)	38.1 (11.1)	3533 (972)	3853 (1295)	D	Mineral Spirits
11/17/82	28	Inlet	2	49.2 (1.3)	ND	ND	ND	15.1[c] (-)	ND	115[c] (-)	921[c] (-)	1100	M	50% Mineral Spirits/50% MIBK
11/17/82	28	Outlet	3	2.1 (0.2)	2.8 (1.5)	1.6 (1.3)	ND	ND	0.6 (-)	ND	ND	7.1 (3.0)	M	50% Mineral Spirits/50% MIBK
11/18/82	28	Inlet	3	32.2 (8.8)	ND	ND	117 (135)	33.9 (13.4)	27.7[f] (10.0)	39.9[f] (17.0)	4411 (5196)	4662 (5380)	H	MIBK
11/18/82	28	Outlet	4	15.4 (8.5)	2.1[g] (0.8)	3.5 (2.0)	3.2[c] (-)	ND	3.1[c] (-)	ND	ND	27.3 (11.3)	H	MIBK
11/19/82	28	Inlet	2	44.3 (2.8)	ND	ND	ND	ND	315 (148)	50.7 (-)	3485 (106)	3895 (257)	J	Mineral Spirits
11/19/82	28	Outlet	2	13.5 (0.0)	1.6 (0.5)	3.0 (1.5)	0.2[c] (-)	ND	5.2 (-)	ND	ND	23.5 (2.0)	J	Mineral Spirits
11/19/82	28	Inlet	3	25.0 (7.8)	ND	ND	ND	ND	136 (23)	NA	5657 (912)	5818 (943)	A	Butyl cellosolve
11/19/82	28	Outlet	1	4.5 (-)	1.7 (-)	6.3 (-)	2.5 (-)	7.2 (-)	ND	ND	ND	22.2 (-)	A	Butyl cellosolve
11/23/82	28	Inlet	3	27.7 (4.4)	ND	ND	ND	ND	73.9 (21.6)	1196 (634)	7727 (2118)	9025 (2778)	L	MIBK
11/23/82	28	Outlet	6	33.1 (5.1)	8.8 (5.4)	4.2[c] (-)	ND	ND	ND	30.2[g] (8.4)	124[g] (135)	200 (154)	L	MIBK
11/19/82	27	Inlet	3	78.9[f] (4.2)	19.2[f] (0.7)	10.6[c] (-)	129 (4)	177 (26)	392 (33)	ND	3460 (303)	4267 (371)	K	Butyl cellosolve

TABLE 5-10. (CONTINUED) SUMMARY OF GAS CHROMATOGRAPH ANALYSES

Date	Incinerator	Sample Location	Number of Samples	C_1	C_2	C_3	C_4	C_5	C_6	C_7[j]	Other C_6^+	THC	Product	Solvent Added to Product
11/22/82	27	Inlet	9	76.3 (17.4)	ND	13.1 (-)	70.2[h] (9.5)	115 (29)	265 (107)	393[e] (54)	2725 (1454)	3658 (1671)	K	Butyl cellosolve
11/22/82	27	Outlet	7	131 (61)	26.7 (2.0)	15.4 (6.5)	8.7[i] (3.0)	13.3 (6.2)	7.2[g] (3.3)	11.3[e] (1.0)	184[i] (183)	398 (266)	K	Butyl cellosolve

[a] ppmv = parts per million by volume quanitated against propane.

[b] None detected. Inlet detection limit for 11/12/82 = 8.2 ppmv, for 11/15, 11/16, and 11/19/82 = 8.5 ppmv, for 11/17 and 11/18/82 = 8.0 ppmv, for 11/22/82 = 17.0 ppmv, and for 11/23/82 = 16.0 ppmv. Outlet detection limit for 11/12, 11/15, and 11/16/82 = 1.0 ppmv, for 11/17, 11/18, and 11/19/82 = 0.1 ppmv, and 11/22, 11/23, and 11/24/82 = 0.75 ppmv.

[c] Based on one sample. Not detected or not available for all other samples.

[d] Not available.

[e] Bases on four samples. Not detected or not available for all other samples.

[f] Based on two samples. Not detected or not available for all other samples.

[g] Based on three samples. Not detected or not available for all other samples.

[h] Based on eight samples. Not detected or not available for all other samples.

[i] Based on six samples. Not detected or not available for all other samples.

[j] Compounds in this column were initially identified as MIBK. However, based on GC/MS results this initial identification may not be valid for some products. The concentration in this column may instead represent butyl-cellosolve or toluene.

No specific identifications are presented in Table 5-10 for C_1 to C_6 compounds due to the varied nature of each of the 7 products analyzed. Some specific identifications have been made based on GC/MS results and these are included in Appendix E. A separate column (C_7) is included in Table 5-8 for compounds which were initially identified as methyl isobutyl ketone (MIBK). Based on the results of the GC/MS analysis of selected samples, this identification is probably valid in some cases. However, it was also noted that the concentration in the C_7 column may also be butyl cellosolve or toluene.

The "other C_6+" column in Table 5-10 presents concentrations for a group of compounds which usually consists of aromatics and alkyl-substituted aromatics such as benzene, toluene, xylenes, and ethyl- and propylbenzenes. Typically, several but not all of these compounds were observed in the samples.

No outlet data are presented for November 15 or 16, 1982. Data collected on these days were invalidated because leaks were found in the GC injection valve. Outlet data for November 12, 17, 18 and 19 also appear to be low but are included in Table 5-10 to provide estimates of the relative amounts of different components in the outlet gas.

Comparison of the inlet GC results on different products shows that Products A, D and J have similar compositions. The inlet gas for these three products have 0 to 1 percent C_2 to C_5 compounds, 2 to 6 percent C_6 and 93 to 97 percent greater than C_6.

Inlet gases for products H and M appear only slightly different from A, D, and J because they contain 1 to 2 percent of C_4 and smaller amounts of C_6. However, the percentage of compounds greater than C_6 is the same, 94 and 95 percent.

Product L contains the highest percentage of compounds with a molecular weight greater than C_6. For this product, approximately 99 percent of the

compounds have a molecular weight above C_6. As discussed in Section 5.2.1, this particular product showed the lowest destruction efficiency measured on incinerator 28.

Product K has the lowest average molecular weight of the products for which GC data are available. This product has approximately 3 to 4 percent of each C_4 and C_5, 7 percent of C_6 and 81 to 85 percent greater than C_6.

The outlet GC samples show a wider range of molecular weights than the inlet samples. All of the outlet samples show compounds in the C_2-C_4 range. Product L again showed the highest molecular weight with 77 percent of the compounds in the outlet gas being heavier than C_6. Product K outlet gas showed compounds ranging from C_2, through C_6, with 49 percent being heavier than C_6.

5.3.2 Gas Chromatography/Mass Spectrometry (GC/MS) Results

A summary of the GC/MS analysis results is presented in this section and the complete results are presented in Appendix G. The results of inlet and outlet sample analyses are presented in Table 5-11 for Product K on incinerator 27 and Product L on incinerator 28. The distribution of the various compounds is presented as a percentage of the total determined hydrocarbon content.

A comparison of the composition of the inlet and outlet samples shows that the general organic character of the gas stream remains unchanged across each of the incinerators. This is especially apparent with incinerator 28 where there is little organic material present in both inlet and outlet other than the aromatic and substituted aromatic compounds.

The results of GC/MS analyses of inlet SLA samples for Product K on incinerator 27 showed compounds ranging in molecular weight from 58 to 142,

TABLE 5-11. GC/MS RESULTS OF CANISTER SAMPLES FROM PLANT C-1
(Values given for each compound represent % of the total hydrocarbons determined)

Compound	Inlet 27 Product K	Inlet 28 Product L	Outlet 27[a] Product K	Outlet 28 Product L
Acetone	3.8			
Cyclopropane			6.3	
Butene				6.1
2-Methylpropene			3.8	
2-Methylbutane	1.5			
Methyl isobutyl ketone		3.9		
Pentane			11.4	
Dimethylpentane	2.2		1.1	
Hexane			2.1	
Heptane				2.4
Methylene heptane	2.0			
Dimethylethylpentane	3.7			
Octane				2.1
Dimethyloctane ($C_{10}H_{22}$)				4.3
$C_7H_{16}O_2$ hydrocarbon	9.4			
C_9 hydrocarbon	4.5			
C_{10} hydrocarbon	4.0		2.2	
Benzene	7.4		7.4	9.1
Toluene	40.6	6.6	30.8	14.0
m/p-Xylenes	13.9	14.5	28.0	8.5
o-Xylenes		10.5	2.5	9.8
Ethylbenzene	7.0	4.6	4.2	2.4
n-Propylbenzene		5.9		3.3
i-Propylbenzene		4.6		4.3
Methyl ethylbenzenes		31.1		19.5
Trimethylbenzenes		16.4		12.8
1,4-Diethylbenzene		2.0		1.5
Average weighted molecular weight	102	114	90	106

[a] A duplicate sample of this stream was also analyzed. These results are presented in Appendix B, but are not included here due to inconsistencies with the other samples.

with an average weighted molecular weight of 102. The average weighted molecular weight was determined by multiplying the fraction of each compound by the corresponding molecular weight and summing the results for all compounds. The composition of this inlet gas is primarily C_7 to C_{10} hydrocarbons and light aromatic compounds. The major components are toluene and xylenes.

Results of GC/MS analyses of inlet SLA samples for incinerator 28 on Product L show compounds ranging in molecular weight from 92 to 134, with an average weighted molecular weight of 114. This sample shows a stronger aromatic character than Product K from incinerator 27. The compounds present are also heavier, more substituted aromatic compounds consisting primarily of methyl ethyl benzenes, trimethylbenzenes, and xylenes.

APPENDIX A

CALCULATION OF INLET SLA FLOWRATE

Inlet SLA flowrates for the Plant C-1 incinerators were estimated by performing a mass balance on CO_2 and total mass around the SLA fan. The details of this estimate method are presented in this Appendix.

A schematic diagram showing gas flows around the SLA blower, the incinerator and the drying oven is shown in Figure A-1. As shown in Figure A-1, air entering the SLA blower can be considered as the sum of two separate gas streams: air in leakage from the oven and hood and recycled gas from the incinerator outlet.

A simplified block flow diagram of the process is shown in Figure A-2a. As shown in Figure A-2a, gas streams entering the process include the in-leakage air and the natural gas for the burner. The only exit stream is the stack gas. For conservation of mass, the air in leakage flowrate must therefore be equal to the stack gas flowrate rate minus the natural gas flowrate.

A block diagram showing the gas streams entering the SLA blower is given in Figure A-2b. Total gas flowrates are denoted in Figure 4-26 by "F" and CO_2 concentrations are denoted by "x". Two mass balance equations can be written for the gas streams entering and exiting the SLA blower.

Total gas mass balance:

$$F_1 + F_2 = F_3 \qquad (1)$$

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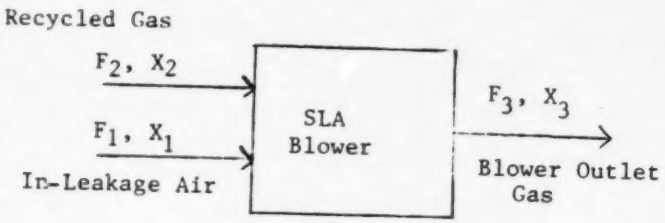
CO_2 mass balance:

$$X_1 F_1 + X_2 F_2 = X_3 F_3 \qquad (2)$$

Four of the six variables in the two above equations are known. As discussed above, F_1 is equivalent to the exhaust stack flowrate minus the natural gas flowrate. The CO_2 concentration at the fan outlet, X_3, was measured by EPA Method 3 at the incinerator inlet and the CO_2 concentration of the recycled gas, X_2, was measured at the incinerator outlet. The in-leakage air CO_2 concentration, X_1, should be equivalent to that of ambient air, which is about 300 ppm.

With four of the six variables in Equations 1 and 2 characterized, this leaves two equations and two unknowns. Solution for these two unknowns gives F_2, the recycled gas flowrate and F_3, the incinerator inlet (fan outlet) gas flowrate. An example of this calculation is given in Table A-1.

TABLE A-1. EXAMPLE CALCULATION OF INLET SLA FLOWRATE



Data

Stack gas flowrate = 3810 dscfm
Natural gas flowrate = 40 dscfm
CO_2 in fan outlet gas = X_3 = 0.68%
CO_2 in recycled gas = X_2 = 1.57%
CO_2 in leakage air = X_1 = 0.03%

Total Mass Balance

$$F_1 + F_2 = F_3$$

CO_2 Balance

$$F_1 X_1 + F_2 Y_2 = F_3 X_3$$

Solution Gives

$$F_3 = F_1 \frac{(X_2 - X_1)}{(X_2 - X_3)}$$

$$F_1 = 3810 - 40 = 3770$$

$$F_3 = 3770 \frac{(1.57-0.03)}{(1.57-0.68)} = 6523 \text{ dscfm}$$

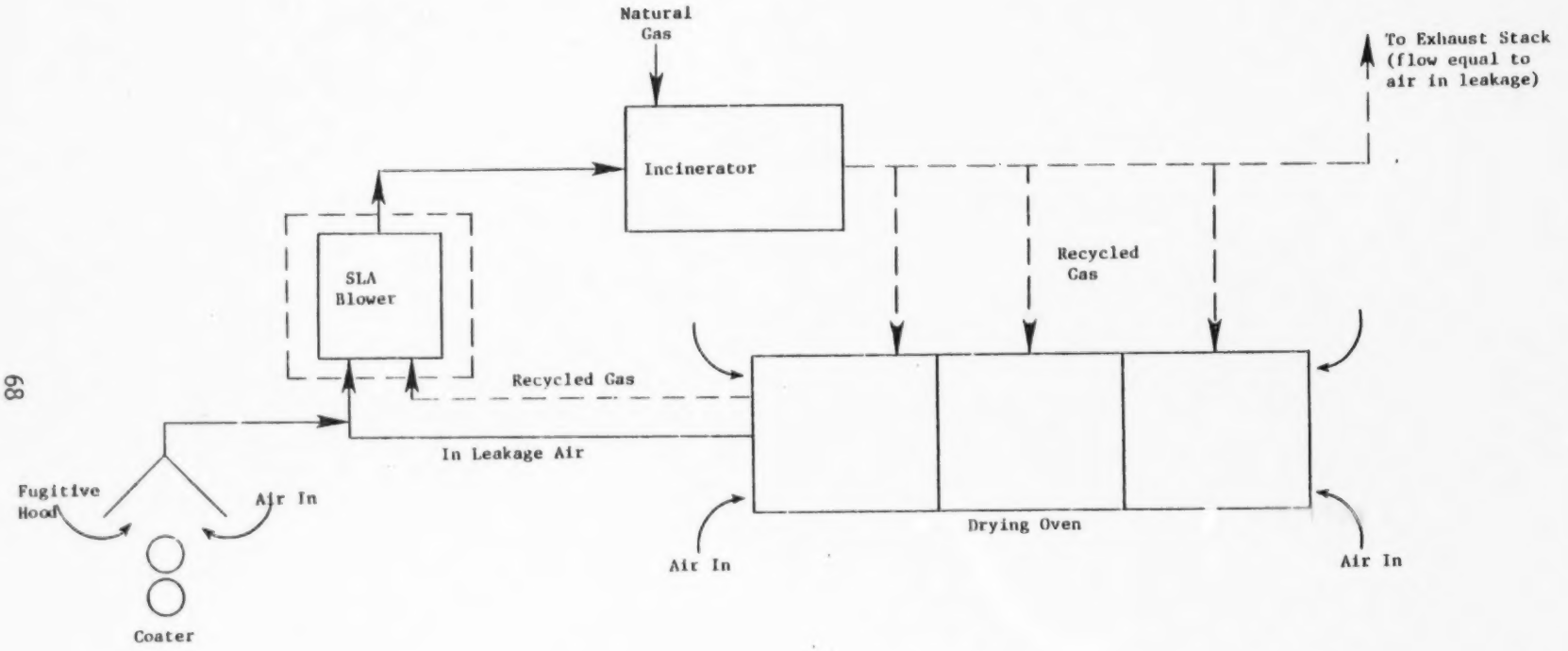


Figure A-1. Diagram of gas flow around SLA burner.

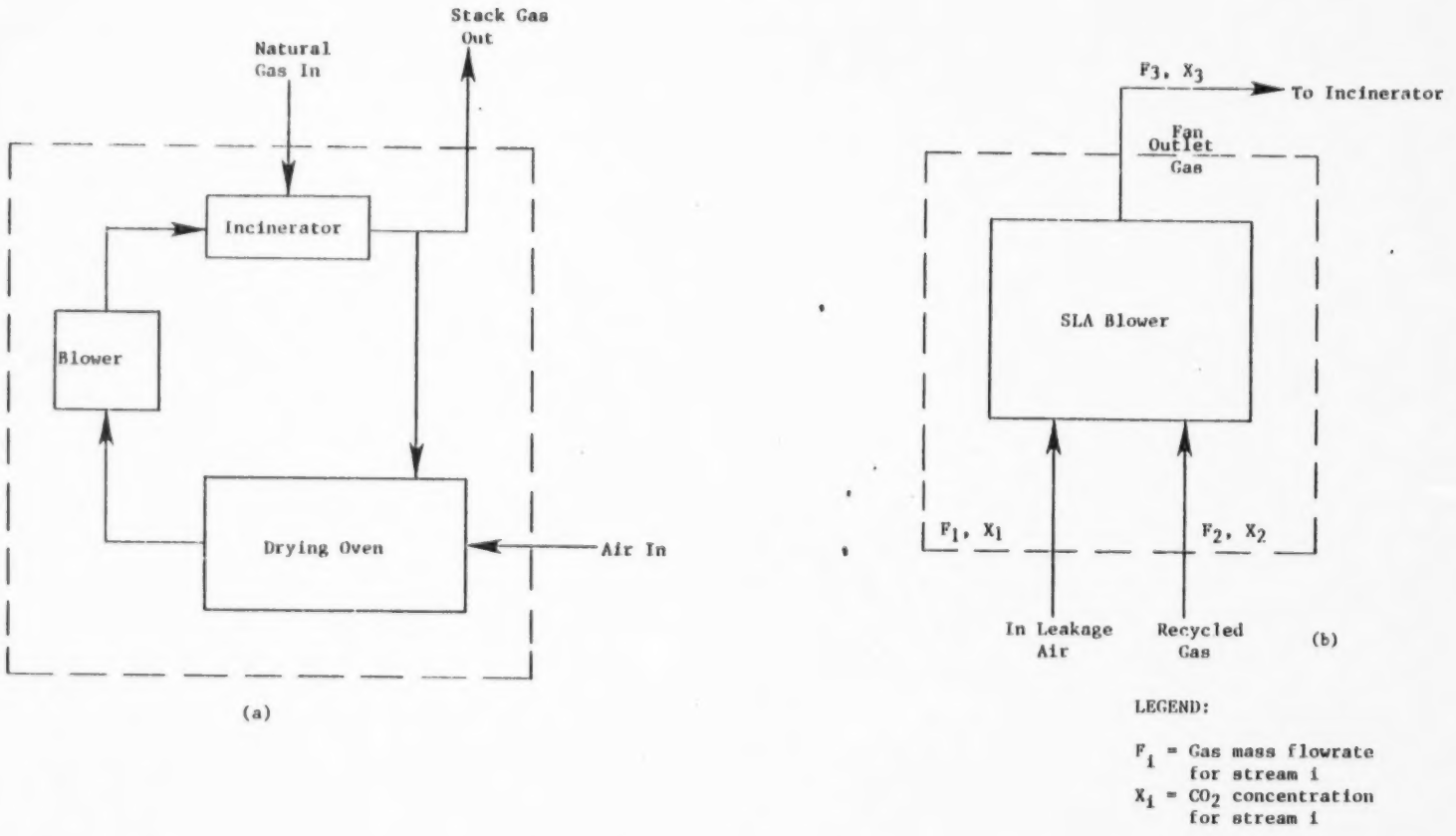


Figure A-2. Simplified block flow diagrams of process and blower.

APPENDIX B

STACK GAS MOISTURE CONTENT AND VOLUMETRIC FLOWRATE

The results of moisture content and volumetric flowrate measurements performed on the incinerator exhaust stacks at Plant C-1 are summarized in Table B-1. Results shown in the tables were measured according to EPA Methods 1, 2 and 4.

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TABLE B-1. RESULTS OF MOISTURE CONTENT AND VOLUMETRIC FLOWRATES FOR PLANT C-1 STACK GAS[a]

EPA METHOD 2 RESULTS								EPA METHOD 4 RESULTS			
Run #	Date	Incinerator	Start Time	Volumetric Gas Flowrate dNm^3/g	(dscfm)	Average Stack Gas Temperature °C	(°F)	Run #	Date	Incinerator	Start Time	Stack Gas Moisture Content (%)
0	11/11	28	1640	1.98	(4204)	441	(826)	0	11/12	28	1321	4.78
1	11/12	28	1908	1.57	(3320)	361	(681)	1	11/15	28	1315	3.66
2	11/15	28	2330	1.86	(3941)	371	(700)	2	11/15	28	2110	3.38
3	11/16	27	1815	2.89	(6120)	393	(740)	3	11/16	27	1615	3.60
4	11/17	28	1500	1.93	(4085)	370	(698)	4	11/17	28	1233	4.00
5	11/17	28	1700	2.02	(4292)	371	(699)	5	11/18	28	1038	3.7
6	11/18	28	1205	1.66	(3530)	376	(708)	6	11/18	28	1839	4.2
7	11/18	28	1715	1.61	(3406)	364	(687)	7	11/19	28	1003	4.3
8	11/19	28	1100	1.76	(3728)	357	(675)	8	11/19	28	1424	4.4
9	11/19	28	1405	1.79	(3785)	361	(682)	9	11/19	27	1802	4.5
10	11/19	27	1700	1.54	(3268)	377	(710)	10	11/22	27	0952	5.1
11	11/22	27	1049	1.68	(3567)	376	(708)	11	11/22	27	1419	4.8
12	11/22	27	1515	1.68	(3559)	371	(699)	12	11/23	27	0759	4.6
13	11/23	27	0910	1.87	(3963)	362	(683)					
14	11/23	27	1312	1.55	(3277)	371	(699)					

[a]Measurements made at roof stack venting to atmosphere.

APPENDIX C

EXAMPLE CALCULATIONS OF EFFICIENCY AND HEAT RECOVERY

Methods used to calculate destruction efficiency and heat recovery are presented in the following subsections.

A.1 DESTRUCTION EFFICIENCY

For Plant C-1, inlet and outlet gas flowrates could not be measured because no acceptable location was available. Destruction efficiency for this plant was based on Method 25A inlet and outlet concentrations as follows:

$$DE = \frac{Vin - Vout}{Vin} \times 100\% = [1 - \frac{Vout}{Vin}] \times 100\% \qquad A\text{-}1$$

where V = THC concentration (inlet or outlet), ppmv

DE = destruction efficiency, %

Destruction efficiencies calculated according to Equation A-1 are essentially equivalent to those that would be calculated on a solvent mass basis since the incinerator inlet and outlet gas mass flowrates are the same except for the addition of a small volume of natural gas at the burner. On a mass basis,

$$DE = \frac{Min - Mout}{Min} \times 100\% = [1 - \frac{Mout}{Min}] \times 100\% \qquad A\text{-}2$$

where DE = destruction efficiency, %

Min = inlet THC mass rate, g C/sec

Mout = outlet THC mass rate, g C/sec

THC mass rates are based on measured Method 25A concentrations and gas flowrates:

$$M = \frac{(V)\ \text{moles C}}{10^6\ \text{moles gas}} \times \frac{12\text{gC}}{\text{mole C}} \times \frac{\text{mole gas}}{0.024\ \text{m}^3\ \text{gas}} \times \frac{(Q)\ \text{m}^3\ \text{gas}}{\text{sec}} \qquad \text{A-3}$$

where M = THC mass rate (inlet or outlet) g C/sec

V = THC concentration (inlet or outlet), ppmv

Q = gas flowrate (inlet or outlet), Nm^3/sec

Substitution of Equation A-3 into A-2 simplifies to:

$$DE = [1 - \frac{Vout\ Qout}{Vin\ Qin}] \times 100\% \qquad \text{A-4}$$

Typical values of Vout, Vin, Qout and Qin for incinerator 27 are 5000 ppmv, 200 ppmv, 3.60 m^3/s (wet) and 3.58 m^3/s, respectively. (Note that Qout = Qin + natural gas = 3.58 + 0.02.) Using these values, the efficiency calculated according to Equation A-4 is 95.98 versus 96.00 according to Equation A-1.

A.2 HEAT RECOVERY

For Plant C-1, heat recovery was defined as the percent of heat generated by natural gas and solvent combustion that is reused in the process. The heat reused in the process was assumed to be equivalent to all heat not exiting the process with the stack exhaust gas. Heat recovery was then calculated as follows:

$$HR = [1 - \frac{Q_{ex}}{Q_{gen}}] \times 100\%$$

where HR = heat recovery, %

Q_{ex} = heat added to stack exhaust gas by natural gas and solvent combustion, J/sec

Q_{gen} = total heat generated by natural gas and solvent combustion, J/sec

The above equation is solved by making the following assumptions and substitutions:

$$HR = [1 - \frac{m_{stack}\ Cp(T_{stack} - T_{sys\ in})}{m_{SLA}\ Cp(T_{catout} - T_{SLA\ in})}] \times 100\%$$

where m = gas mass flowrate (stack gas or SLA), g mole/sec

Cp = average specific heat of SLA for the range of temperature, J/g mole °K

T_{stack} = temperature of the stack exhaust gas, °K

$T_{sys\ in}$ = temperature of system in leakage air entering the ends of the drying oven, °K

T_{catout} = temperature of SLA exiting the catalyst bed, °K

$T_{SLA\ in}$ = temperature of SLA entering the incinerator, °K

The temperature of the in leakage air is equal to the ambient temperature of the coating room near the oven or approximately 32°C (90°F).

APPENDIX D

METHOD 25A SAMPLING DATA

Method 25A sampling data are presented in this appendix. Each section of the appendix contains different data sampling locations as follows:

Section D.1 - Incinerator #27 Inlet
Section D.2 - Incinerator #28 Inlet
Section D.3 - Incinerator #27 Outlet
Section D.4 - Incinerator #28 Outlet

Breaks in the data are due to (1) calibration of the Byron analyzers, (2) prolonged shutdowns of the manufacturing process, or (3) instrument malfunctions.

The data tabulated in the following sections are expressed in ppmv as carbon (C_1). Data given at one-minute intervals were collected with the Byron 401 in the total hydrocarbon (THC) mode. Data given at three minute intervals were collected with the Byron 301 in the methane (CH_4) and nonmethane hydrocarbon (NMHC) mode. Data given at twelve-minute intervals were collected with the Byron 401 in the full-scan mode.

Overranges (OVRNGE) occurred when the concentrations exceeded the full scale of the analyzer. An overrange by the Byron 401 in the THC mode or the Byron 301 in the CH_4 mode caused all analyzers and modes to record an overrange.

The minimum detection limit for the Byron 301 analyzer in the NMHC mode was 120 ppmv. Any lower concentrations were considered to be 120 ppmv for averaging purposes.

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Two formats are used in the data listings. The majority of the data, except for the first few days of Incinerator #28 outlet concentrations, are presented in a twelve column arrangement. The first column contains the date on which the sampling was performed. The second column gives the end time at which the sample was taken for the concentration given in column three of that row. Columns three through twelve contain from one to ten consecutive concentrations beginning at the time given in column two of that row. The time interval between successive concentration values depends on the analyzer and mode used in sampling.

The format for the early Incinerator #28 outlet concentrations is similar, but only five columns instead of twelve are used. The first two columns again contain the date of sampling and the time of sampling resulting in the concentration given in column three of that row. Columns three through five contain up to three consecutive concentrations for the samples taken beginning at the time in column two.

The following excerpt from the Incinerator #27 Inlet CH_4 Concentrations is used as an example of the twelve column format:

Date of Sample:

11/16/82:

End Time of Sample	Inlet CH_4 concentrations at 3 minute intervals									
[illegible]	[illegible]	[illegible]	20.11	20.9	33.41	27.0a	30.a2	27.14	24.4[illegible]	[illegible]
[illegible]	[illegible]	[illegible]								
1a1[illegible]	[illegible]	4a.27	a0.72	a2.01	a0.2	3a.94	27.99	29.1[illegible]	24.[illegible]	27.[illegible]
[illegible]	[illegible]	24.4[illegible]	24.02	21.0[illegible]	22.97	21.0[illegible]	[illegible]	21.32	21.22	[illegible]
[illegible]	[illegible]	22.27	20.0	22.0[illegible]	20.0	20.20	21.0[illegible]	22.0[illegible]	22.97	24.4[illegible]
15a[illegible]	[illegible]	20.71	21.22	20.71	22.27	21.22	21.22	21.0[illegible]	21.4	22.4[illegible]	24.01

The sampling interval for these concentrations is three minutes. The number in the first column of the first row is the date of sampling, 11-16-82. The second number in this row is 13:0[illegible], the end time for the sample whose concentration is given as 19.81 ppmv in column three. The concentration

found in column four, 20.36 ppmv, represents the sample analyzed between 13:05 and 13:08 that is, the sample ending three minutes later than the first time given. The final number in that row, in column twelve, is 35.5 ppmv. This is the concentration found in the ninth sample taken after the 13:05 sample. The time period for this sample is thus 13:29 to 13:32.

The second row has no date in column one, so the last previously given date is in effect for this row. The time given in column two, 14:04, indicates that the first sample whose concentration is given in this row was analyzed from 14:01 to 14:04. Thus, no samples were taken from 13:32 to 14:01. The concentration of the 14:04 sample is 36.02 ppmv as seen in column three.

The first sample represented in row four was analyzed on 11/16/82 from 14:34 to 14:37. The concentration of CH_4 in this sample is 37.59 ppmv. The last column in this row is the concentration, 31.32 ppmv of the sample taken during 15:01 to 15:04. Row five begins with the sample analyzed between 15:04 and 15:07 which had a concentration of 29.23 ppmv. Thus, no data gaps occur between these two rows, as was the case above.

SECTION D.1

INCINERATOR #27 INLET CONCENTRATIONS

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Incinerator 27

Date of Sample	End Time of Sample	Inlet CH_4 Concentrations (ppmv) at 3 min. intervals									
11/16/82	13:05	19.83	20.36	28.11	25.5	33.41	37.06	28.63	27.14	24.45	25.5
	14:04	36.02									
	14:07	42.81	44.37	40.72	42.81	40.2	36.54	37.59	39.15	34.98	37.59
	14:37	37.59	34.45	36.02	31.84	33.93	31.84	35.5	31.32	31.32	31.32
	15:07	29.23	32.37	30.8	32.89	30.8	30.28	31.84	32.89	32.93	34.45
	15:37	28.71	31.32	28.71	32.37	31.32	31.32	31.84	21.4	22.45	24.01
	16:07	10.96	21.4	32.37	33.93	36.02	30.8	25.5	31.84	32.93	32.37
	16:37	34.45	33.93	31.32	33.93	29.23	33.41	30.8			
	16:58	31.32	28.71	32.89	32.37	28.19	30.9	27.67	29.23	32.89	34.98
	17:28	67.25	97.11	74.66	68.39	0					
	20:46	53.25	50.28	29.75	54.82	60.04	63.17	60.56	57.95	56.9	49.07
	21:16	29.67	29.23	26.1	14.09	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE	130.5
	21:46	128.9	42.29	29.67	29.15	47.85	40.72	43.85	37.06	30.8	30.28
	22:16	33.93	28.19	34.98	41.76	51.16	55.34	61.08	63.69	21.4	29.23
	22:46	29.23	4.698	29.23	29.23	29.23	29.23	29.23	29.23	29.23	29.23
	23:16	40.2	26.62	29.23	30.8	31.84	28.11	28.19	28.71	28.19	28.19
	23:46	28.71	61.6	28.19	28.19	69.96	68.39	OVRNGE	OVRNGE	104.9	103.3
11/17/82	00:16	48.55	56.9	98.67	OVRNGE	OVRNGE	71	111.2	OVRNGE	OVRNGE	OVRNGE
	00:46	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE	120	OVRNGE	OVRNGE	OVRNGE	44.37
	01:16	131.5	OVRNGE	117.4	OVRNGE	OVRNGE	OVRNGE	OVRNGE	0	17.22	15.57
	01:46	22.97	24.53	32.89	32.89	30.8	34.98	29.67	41.24	44.37	32.37
	02:16	69.18	53.28	32.37	28.58	27.67	17.22	22.45	34.98	44.9	21.92
	02:46	52.73	52.73	55.34	24.01	22.45	29.36	16.18	22.45	21.4	21.4
	03:16	19.31	20.36	20.88							
	03:28	13.57	16.18	17.22	15.66	16.7	13.57	20.88	46.98	29.15	34.98
	03:55	36.54	37.59	29.23	31.32	29.75	34.98	28.11	28.71	27.14	24.98
	04:28	20.36	24.53	27.14	25.06	20.28	42.29	40.72	48.03	28.11	26.07
	04:55	34.98	28.67	36.02	47.33	42.81	42.29	47.85			
	05:16	28.06	27.67	34.98	28.11	29.51	29.23	45.42	40.04	44.74	51.68
	05:46	49.99	50.12	47.33	45.42	45.42	44.9	46.98	41.76	42.81	53.25
	06:16	45.42	43.17	42.13	42.65	44.9	41.08	45.78	42.65	47.51	40.72
	06:46	36.9	40.2	40.72	44.27	54.82	73.41	44.9	48.03	42.13	42.13
	07:16	40.56	39.91	37.95	37.43	33.25	34.29	35.86	37.95	37.43	35.86
	07:46	35.34	35.34	31.16	33.25	50.12	47.51	40.2	34.82	45.26	71.53
	08:16	73.41	71.32	73.41	45.26	40.04	48.03	42.29	47.51	36.9	46.98
	08:46	61.08	37.43	47.51	41.76	46.46	32.21	34.82	29.51		
11/19/82	18:16	76.46	69.99	65.82	51.68	46.82	77.79	77.27	73.09	55.94	49.47
	21:46	81.64	75.18	75.68	61.08	52.77	47.51				
	22:37	67.07	58.67	57.95	73.09	65.78	62.01	67.19	66.1	75.18	67.69
	23:07	75.18	62.13	52.77	56.38	61.6	79.35	64.58	67.19	73.09	67.15
	23:37	57.62	64.27	58.67	56.9	61.66	64.58	78.82	75.7	79.31	67.33
11/20/82	18:07	67.07	53.77	60.72	50.12	49.62	57.43	61.66	51.16	60.72	51.68
	18:37	51.68	75.08	58.92	74.66	74.13	79.83	64.58	65.78	58.12	58.12
	19:07	55.86	74.22	54.66	64.08	74.13	62.65	59.51	51.68	65.78	60.92
	19:37	75.7	61.6	47.87	53.77	66.66	50.64	54.29	62.13	67.78	72.97
	20:07	66.3	75.7	62.65	56.38	67.51	50.64	54.29	64.74	65.94	67.78
	20:37	75.08	64.58	64.08	71	62.69	79.08	67.87	58.51	64.74	67.33
	21:07	66.76	57.43	62.13	74.66	53.77	79.08	61.53	61.66	73.61	68.91
	21:37	67.61	55.86	69.99	66.66	51.77	61.08	66.82	76.48	72.57	68.91
	22:07	62.65	62.13	52.77	61.34	56.9	74.66	74.66	67.71	68.43	60.43
	22:37	74.74	76.83	68.91	55.86	51.68	54.30	71.52	65.94	61.6	54.9
	23:07	62.13	73.57	51.16	68.78	79.35	62.13	62.69	66.66	66.98	64.91
	23:37	73.57	80.43	77.78	74.22	78.17	71.52				
	23:55	73.61	75.68	71.86	19.74	16.7	16.18	16.61	16.7	16.18	16.7
	24:25	24.53	20.88	18.27	21.4	17.83	20.88	21.92	21.92	22.45	21.92
	24:55	20.88	17.74	17.74	16.18	16.7	17.22	17.66	16.18	18.14	

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Incinerator 27

Date of Sample	End Time of Sample	Inlet CH_4 Concentrations (ppmv) at 3 min. intervals									
11/22/82	[illegible]	105.9	84.58	89.8	102.8	98.15	85.1	62.13	65.26	74.66	79.88
	[illegible]	101.8	83.01	94.5	87.35	87.19	102.3	100.2	80.92	77.27	74.66
	[illegible]:14	72.05	76.22	50.64	84.74						
	09:34	20.88	14.61	12.53	12	14.09	20.88	20.36	22.97	19.93	19.31
	10:04	22.77	24.53	16.18	12.57	12.08	17.75	10.44	13.57	15.66	20.88
	10:34	29.67	22.89	23.49	18.27	13.02	14.61	9.919	12	10.44	21.4
	11:04	23.93	24.45	16.18	12.53	10.96	13.02	17.75	10.44	14.61	19.83
	11:42	12.57	40.72	22.45	13.06	12.53	8.353	7.309	7.831	8.353	10.44
	12:19	12	17.22	21.4							
	12:34	24.93	16.18	16.18	13.57	9.397	8.353	10.44	18.27	31.84	29.23
	12:54	21.4	12	14.09	10.96	8.875	9.397	12	25.06	33.93	24.01
	13:24	15.14	9.397	15.14	12	8.875	8.875	10.96	9.397	19.83	33.93
	14:03	34.98	16.18	10.96	10.96	13.06	19.83	18.27	14.09	9.919	8.875
	14:33	14.61	8.353	8.875	15.14	24.53	36.02	17.75	9.919	7.309	9.919
	15:03	7.831	11.48	20.36	31.84	29.23	23.49	6.787	8.875	12	17.75
	15:33	29.23	17.75	29.75	27.67	17.75	8.353	7.309	12	17.22	28.71
	16:03	34.98	13.57	13.57	13.57	13.57	14.61	7.309	8.353	7.309	9.397
	16:33	4.698	13.06	9.919	7.309	8.875	11.48	8.353	14.09	21.4	29.75
	17:03	33.41	12.53	9.397	8.353	9.919	16.18	10.44	9.397	5.743	16.18
	17:33	13.06	9.397	7.309	7.831	9.397	12.53	17.22	18.27	21.4	33.41
	18:03	25.06	32.89	28.19	17.75	9.397	8.875	15.14	22.45	28.19	40.2
	18:33	27.14	30.28	33.93	27.14	17.22	14.09	12.53	8.875	9.397	10.96
	19:03	17.22	34.98	38.11	27.67	18.79	12.53	12.53	16.7	16.7	15.14
	19:33	15.66	30.8	34.98	29.23	18.27	10.44				
	20:03	10.96	7.831	9.919	21.4	17.75	21.92	9.397	9.397	12	21.4
	21:33	33.41	12	9.397	11.48	29.75	23.49	20.36	9.397	8.875	10.44
	21:53	12	15.14	19.83	8.875	17.75	13.06	7.309	7.831	10.44	24.53
	22:33	28.58	8.875	9.919	28.62	8.353	8.875	10.96	19.83	31.84	14.61
	22:53	8.875	9.397	14.09	27.14	20.36	13.06	9.919	9.919	9.919	9.919
	23:33	28.06	28.1	17.22	17.22	8.353	9.397	12	21.92	28.5	11.48
	23:53	7.309	9.397	15.14	25.58	8.353	10.96	16.7	27.14	23.49	9.397
11/23/82	00:33	15.57	28.06	22.89	16.7	12	12.53	8.875	9.919	16.7	23.49
	00:53	22.89	13.57	8.875	10.96	18.79	28.11	22.97	10.44	9.919	14.61
	01:33	30.8	18.79	9.397	6.787	10.96	10.96	14.09	17.22	18.27	20.36
	01:53	17.75	13.57	11.48	7.309	16.7	28.19	22.45	13.57	12.53	17.75
	02:33	15.14	9.919	9.919	15.14	30.28	28.58	10.96	13.57	8.875	13.57
	02:53	28.58	28.62	17.22	9.397	14.61	13.06	9.919	10.96	14.09	28.62
	03:33	24.01	12.53	9.397	10.96	28.06	17.75	18.79	17.22	14.61	11.48
	03:53	8.353	8.353	8.353	9.397	12	16.18	20.36	17.22	9.919	8.353
	04:33	11.48	8.875	13.06	20.88	31.32	29.75	9.919	9.397	12.53	18.79
	04:53	29.75	13.57	7.831	8.353	10.96	10.44	18.27	28.58	20.36	8.875
	05:33	7.831	11.48	28.19	31.32	19.31	9.397	7.831	8.353	8.353	12
	05:53	16.18	18.79	19.83	14.09						
	06:09	9.397	14.09	28.62	28.62	7.831	8.353	11.48	18.79	28.71	10.44
	06:29	16.61	12	13.06	12	7.831	13.57	27.14	27.67	21.92	18.79
	07:09	7.831	7.831	9.397	19.31	30.28	24.01	12	8.875	15.66	29.23
	07:29	28.01	14.09								

Incinerator 27

Date of Sample	End Time of Sample	Inlet NMHC Concentrations (ppmv) at 3 min. intervals									
11/16/82	13:05	905.7	832.3	1982	2129	2203	2276	2056	318.2	195.8	782.7
	14:04	1003									
	14:07	1836	1909	1248	1419	2007	2129	2203	1272	2056	2227
	14:37	2227	2276	2276	1664	1395	1787	1836	2105	2154	2007
	15:07	612	416.1	1199	1566	1689	1419	1860	1982	2007	2056
	15:37	2056	2031	1150	1713	1272	1958	1958	1126	1028	685.4
	16:07	318.2	1003	1297	1982	2178	2203	2252	1566	2056	1860
	16:37	2129	2203	2031	2154	1346	2129	2350			
	16:58	930.2	440.6	342.7	244.8	122.4	97.92	73.44	146.8	73.44	146.8
	17:28	122.4	97.92	122.4	97.92	0					
	20:46	1860	2007	2301	2252	2350	2497	2545	1664	2105	2497
	21:16	2545	2741	2741	2643	OVRNGE	OVRNGE	2643	2916	OVRNGE	OVRNGE
	21:46	OVRNGE	1224	1126	832.3	881.3	685.4	1468	1958	2203	2448
	22:16	2399	2105	2399	2399	2545	2497	2545	2497	2594	2252
	22:46	2497	2545	2497	2350	2497	2741	2594	2252	1615	1272
	23:16	1077	1713	2154	2399	2399	2497	2448	2643	2399	2350
	23:46	2594	2643	2545	2497	2594	2545	2545	1209	1860	1664
11/17/82	00:16	2252	2448	2399	OVRNGE	OVRNGE	OVRNGE	2252	2056	2105	OVRNGE	OVRNGE
	00:46	OVRNGE	10477	OVRNGE	OVRNGE	OVRNGE	1811	OVRNGE	OVRNGE	9743	1272
	01:16	12338	OVRNGE	979.2	OVRNGE	OVRNGE	OVRNGE	OVRNGE	1566	1419	783.3
	01:46	930.2	734.4	195.8	146.8	0	195.8	195.8	930.2	1419	1664
	02:16	1272	1615	1419	1713	1713	146.8	48.96	1175	1370	979.2
	02:46	1468	1370	1762	1860	1566	1224	1419	1224	1370	1419
	03:16	1615	1321	1370							
	03:28	195.8	489.6	489.6	391.6	391.6	244.8	636.4	293.7	48.96	342.7
	03:58	244.8	342.7	0	0	0	0	0	0	48.96	832.3
	04:28	734.4	979.2	783.3	734.4	0	489.6	97.92	979.2	293.7	293.7
	04:58	0	48.96	0	48.96	48.96	0	293.7			
	05:16	2888	3770	4553	4798	3229	4847	5336	5238	4308	2888
	05:46	2399	1762	881.3	440.6	293.7	0	0	0	0	1566
	06:16	1517	3427	4112	4798	5140	3867	5091	5385	5434	5679
	06:46	4700	6071	6511	6267	6267	4700	5875	6071	3672	3229
	07:16	2741	2105	1615	1321	832.3	587.5	489.6	440.6	342.7	146.8
	07:46	244.8	244.8	734.4	2252	3280	3038	4014	4553	4406	4504
	08:16	4700	6945	5287	5336	5581	5483	5287	5581	5630	4945
	08:46	3672	4749	3182	2741	1958	1468	930.2	636.4		
11/19/82	19:18	3a70	5154	5a06	5404	5825	3793	5113	5a0[illegible]	5896	10268
	20:06	2a80	2515	2144	1219	824.7	907.2				
	[illegible]	5278	5722	5815	5a06	5193	5825	5a90	5a0[illegible]	5814	5113
	[illegible]	4a56	5478	[illegible]	2144	3792	6000	4041	229[illegible]	2309	2309
	[illegible]	[illegible]	[illegible]	2a80	2144	3299	387a	4288	678[illegible]	3216	4206
11/20/82	[illegible]	5113	5587	4824	4989	3782	6483	6164	280[illegible]	6164	2886
	[illegible]	6267	4553	5a38	2252	2a80	3178	2937	612[illegible]	4483	4824
	[illegible]	4a56	4288	6742	5a50	5a50	5278	2587	3a2[illegible]	2546	4229
	[illegible]	4a56	3134	2391	2246	2029	1443	1030	824.7	783.5	618.5
	[illegible]	2391	2949	1979	5458	4288	4824	4824	3827	4846	5227
	[illegible]	5227	5246	5198	6742	5198	5227	5719	5a40	5806	5198
	[illegible]	5a96	5825	5246	4824	4824	5134	5246	5a4[illegible]	5740	4771
	[illegible]	5278	5a02	5381	5a51	5a42	2a80	1855	13a[illegible]	1113	783.5
	[illegible]	879.5	9[illegible]	618.5	2029	2927	3246	3246	279[illegible]	6247	6a18
	[illegible]	6a13	3a38	5113	5246	5a49	5246	3a38	5a7[illegible]	5a48	5722
	[illegible]	5722	6719	5a02	5722	5814	5722	5a02	5a4[illegible]	5773	5938
	[illegible]	5a14	5a96	3a38	3246	5134	3a38				
	[illegible]	[illegible]	8a7.3	83a	229.9	371.1	2a7.6	2a7.6	183.[illegible]	229.9	694.8
	[illegible]	2a7.6	229.9	2a7.6	2[illegible]1	229.9	388.6	388.6	93.[illegible]	452.6	452.6
	[illegible]	452.6	6[illegible]3	452.6	83a	83a	452.6	452.6	6[illegible]8.	452.6	

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Incinerator 27

Date of Sample	End Time of Sample	Inlet NMHC Concentrations (ppmv) at 3 min. intervals									
11/22/82	07:14	3105	2458	2975	3018	3234	3191	OVRNGE	1336	1811	1811
	07:44	OVRNGE	1768	2070	1164	1509	1725	2760	1768	1725	1897
	08:14	2070	388.1	1897	1983						
	09:34	2544	6253	7159	7374	7547	5218	6900	7116	6943	6943
	10:04	3838	6555	6857	6900	7159	4571	6727	7288	7245	7288
	10:34	1595	5822	6339	6296	6382	3450	6339	6814	2113	4140
	11:04	6080	1336	5951	6167	6469	6598	2717	6253	6512	6555
	11:45	5175	301.8	0	0	0	0	0	0	0	0
	12:15	0	0	1293							
	12:24	4830	4183	4787	4959	5477	5865	5865	5261	5606	5304
	12:54	5132	5520	4959	5347	5908	6124	6382	5606	5563	5434
	13:24	5649	5865	431.2	431.2	172.5	172.5	215.6	6210	6641	6296
	14:03	2070	5822	6555	6598	6900	3148	5606	5735	5779	5865
	14:33	2501	5779	6080	6124	5951	2544	5089	5563	5822	1940
	15:03	3665	6253	6167	5735	5520	3320	5477	5908	6037	5951
	15:33	2156	5520	5434	5218	5175	2156	5563	5692	5563	5563
	16:03	1725	5304	5304	5520	5347	1078	5347	1121	0	603.7
	16:33	0	1293	4787	5002	1380	0	5218	5563	5606	5347
	17:03	345	4873	5261	5520	5779	1164	5692	560.6	1380	4657
	17:33	905.6	43.12	0	0	0	0	0	0	4830	5045
	18:03	5261	4959	5175	5175	4485	5735	5908	5606	5779	5089
	18:33	4097	5390	5261	5089	5132	5261	5261	5390	5692	5735
	19:03	5692	5649	5089	5045	5304	5520	5606	5520	5563	5434
	19:33	5735	5649	5261	5089	5002	5563				
	20:52	4477	10144	10478	9239	.8382	5143	8525	9239	9430	8620
	21:22	4477	7525	8954	9525	476.2	0	0	0	0	0
	21:52	0	6382	6048	6334	8049	8049	8334	5524	9287	9287
	22:22	7715	5381	5000	1857	6334	6763	7191	7001	2571	5858
	22:52	6525	6953	7287	3857	1190	190.5	0	95.25	0	6191
	23:22	6620	6239	6382	4477	6239	6763	7001	6953	666.7	5953
	23:52	6763	7287	7096	619.1	6429	7001	7001	6477	2333	6429
11/23/82	00:22	6906	6953	5953	6096	6525	6286	6334	6620	6667	7001
	00:52	6144	6429	6477	7287	7382	6429	6191	6572	7001	7191
	01:22	6667	5286	285.7	3048	238.1	47.62	0	0	0	0
	01:52	0	5572	6429	6525	6667	6429	6048	6096	6382	6239
	02:22	6239	6477	6763	6286	6239	5953	5429	2143	6429	6334
	02:52	6572	5810	6048	6334	5620	6144	6429	6810	6858	5239
	03:22	5810	5953	6382	6620	142.8	0	0	0	0	0
	03:52	0	0	0	0	0	666.7	6001	5810	6144	6429
	04:22	1524	6810	7096	6906	6239	1000	6191	6715	7096	7144
	04:52	1285	5905	6477	6858	6810	2238	6429	6334	6096	6429
	05:22	6572	6525	6525	5953	1095	0	0	0	0	0
	05:52	0	0	1381	5810						
	06:09	6763	7048	6810	1238	6239	6620	6810	6858	1952	6382
	06:39	6429	6429	6667	3000	6763	6906	6715	95.25	0	95.25
	07:09	6144	5953	6715	7287	6667	6620	6382	6810	7525	6715
	07:39	6572	6715								

SECTION D.2

INCINERATOR #28 INLET CONCENTRATIONS

Incinerator 28

Date of Sample	End Time of Sample	Inlet CH_4 Concentrations (ppmv) at 3 min. intervals									
11/12/82	20:03	16.7	11.48								
	20:33	8.875	9.397	13.05	10.44	6.265	10.44	10.96	13.57	19.31	17.22
	21:03	15.14	16.79	24.01							
	22:33	6.787	6.265	5.743	5.221	4.698	3.654	6.787	6.787	6.265	5.743
	23:03	8.353	8.875	8.875	4.698	5.743	7.309	7.831	10.96	8.875	8.875
	23:33	8.875	11.48	12	10.96	9.919	8.875	11.48	9.397	9.919	7.309
11/13/82	00:03	7.831	8.353	8.875	9.919	8.875	9.919	7.831	8.875	7.831	8.353
	00:33	7.831	8.875	8.875	8.875	8.875	8.353	8.875	5.221	3.654	4.698
	01:03	8.875	6.787	8.353	8.353	4.176	4.176	4.698	6.265	7.309	7.309
	01:33	8.875	7.831	7.831	8.353	5.743	5.743	6.787	7.831	9.397	9.397
	02:03	8.353	8.875	8.875	8.875	8.875	7.309	6.787	5.743	5.221	4.176
	02:33	2.61									
	02:36	4.176	5.221	5.743	7.309	6.265	6.265	7.309	7.309	7.831	7.831
	03:06	8.353	7.831	8.353	8.353	8.875	8.353				
	03:24	17.75	11.48	9.919	10.96	10.44	10.44	7.309	4.698	6.787	7.309
	03:54	5.743	9.919	10.96	14.09	18.79	18.27	17.22	19.83	131.5	OVRNGE
	04:24	OVRNGE	20.36	24.01	24.01	27.14	25.06	21.92	15.66	20.36	15.66
	04:54	131.5	131.5	131.5	16.18	14.09	37.06	37.06	37.06	37.06	OVRNGE
	05:24	OVRNGE	131	131	11.48	36.54	36.54	36.54	36.54	36.54	36.02
	05:54	131.5	131	131	130.5	2.088	14.61	32.37	35.5	35.5	35.5
	06:24	34.98	34.98	106.5	OVRNGE	118.5	131	131			
	06:45	9.919	10.44	10.44	10.44	9.919	9.397	9.919	12	13.05	12.53
	07:15	10.96	9.919	9.919	9.397	10.44	10.44	9.919	9.397	8.875	9.397
	07:45	9.919	10.44	10.96	10.96	11.48	10.96	10.44	10.44	11.48	12.53
	08:15	13.57	14.61	14.09	14.09	14.09	12.53	10.44	8.353	6.265	5.221
	08:45	4.176	3.654	3.654	3.654	3.132	3.132	3.654	3.132	3.132	3.654
	09:15	3.132	3.132	3.132	3.132	2.61	3.132	2.61	2.61	2.61	3.132
	09:45	2.61	2.61	2.61	2.61	2.61	2.61	2.088	2.088	2.088	2.088
	10:15	2.088	2.088	2.088	2.088	2.088	2.61	2.61	2.088	2.088	2.088
	10:45	2.088	2.088	2.61	2.61	2.088	2.088	2.088	2.088	2.61	2.088
	11:15	2.088	2.088	2.61	2.61	2.088	2.088	2.088	2.088	2.088	2.088
	11:45	2.61	2.61	2.61	2.61	2.61	2.088	2.088	2.61	2.61	
11/15/82	19:42	7.309	4.698	5.221	8.875	8.875	6.787	12	10.96	7.831	6.787
	20:12	6.787	6.265	5.221	6.787	7.831	10.96	8.875	10.96	13.05	9.919
	20:42	9.397	9.397	7.831	5.221	1.566					
	21:12	7.831	4.176	2.61	3.132	3.132	9.397	12	15.14	9.919	13.05
	21:42	15.66									
	21:54	3.132	3.132	3.132	14.61	14.61	17.22	17.22	18.79	17.75	
	22:30	14.61	18.79	13.57	12.53	12.53	6.265	3.654	6.265	7.309	8.875
	23:00	8.875	8.875	9.919	11.48	9.397	10.96	15.14			
11/16/82	00:30	15.66	14.61	16.18	16.18	72.05	69.91	65.78	69.96	0	
	01:00	0	0	13.57	19.83	16.7	14.09	14.09	.5221	5.221	15.14
	01:26	4.698	9.397	10.44	3.654	6.265	2.61	1.044	2.61	4.698	3.654
	01:56	5.743	12	13.57	15.14						
	02:08	17.22	18.79	13.57	17.22	13.05	17.22	12	16.7	18.79	17.22
	02:38	17.75	18.27	17.22	15.66	17.22	20.88	15.14	7.831	13.57	20.36
	03:08	23.49	21.92	19.83	19.83	18.27	19.83	17.75	20.19	27.67	20.88
	03:38	24.53	24.01	15.66	21.4	19.83	18.79	30.28	18.27	21.92	20.36
	04:08	25.58	22.45	20.88	25.58	23.49	27.14	24.53	19.31	24.53	23.49
	04:38	24.53									
	04:41	21.4	18.79	20.88	17.75	20.36	22.45	21.4	24.53	22.45	24.53
	05:11	8.353	8.353	23.49	17.75	19.31	21.92	22.97	22.45	20.36	22.97
	05:41	24.53	20.36	18.79	18.27	20.88	22.45	21.4	21.92	21.4	25.58
	06:11	24.53	11.48	10.96	10.96	15.14	21.92	20.88	22.97	16.18	6.265
	06:41	10.96	16.7	21.4	17.22	9.397	9.831	10.44			
	07:02	8.353	10.44	9.397	11.48	10.96	12	13.57	12	15.66	10.96
	07:32	0	0	0	0	0	0	0	0	0	0
	08:02	0	0	0	0	1.044	5.221	6.265	3.654	0	3.654
	08:32	0	8.353	3.654	0						

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Incinerator 28

Date of Sample	End Time of Sample	Inlet CH_4 Concentrations (ppmv) at 3 min. intervals									
11/19/82	00:23	15.66	28.19	27.67	27.14	13.05	11.48	12.53	18.79	24.01	17.75
	00:53	24.53	28.19								
	00:59	28.19	28.19	25.58	24.01	22.97	18.79	14.09	9.919	11.48	11.48
	01:29	10.96	8.353	9.919	20.88	22.97	21.4	20.36	21.92	21.4	25.06
	01:59	19.83	21.92	21.92	20.36	18.27	15.66	8.875	16.7	14.09	19.31
	02:29	21.4	21.4	22.45	17.22	12.53	9.397	17.75	13.05	18.27	20.88
	02:59	22.45	7.831	5.743	6.265	6.265	6.787	5.743	6.787	6.265	7.309
	03:29	6.265	5.743	13.05	19.31	19.83	17.75	16.7	18.27		
	03:53	14.09	15.66	22.45	15.14	16.18	17.22	16.7	18.79	16.18	17.22
	04:23	19.31	23.49	16.7	17.22	18.79	20.36	14.61	4.176	4.176	3.654
	04:53	3.654	4.176	4.176	4.176	6.787	5.221	4.698	4.698	3.654	4.176
	05:23	5.221	6.265	16.7	17.22	17.22	21.4	19.31	16.18	19.83	17.22
	05:59	21.4	18.79	17.22	18.79	21.4	17.22	19.31	17.22	20.36	15.66
	06:23	16.18	17.22	19.31	19.31	18.79	17.75	17.75	19.83	16.7	12.53
	06:59	16.7	18.79	11.48	14.61	16.18	16.7	16.7	17.22	18.79	8.353
	07:23	5.221	5.743	4.176	4.698	5.221	5.743	5.221	5.743	4.176	4.698
	07:53	5.221	5.743	4.698	4.698	5.743	4.176				
	08:59	2.088	21.92	19.31	21.4	18.27	15.14	11.48			
	09:18	8.875	10.44	6.265	5.743	5.743	4.698	5.743	4.698	5.743	4.698
	09:53	6.787	4.698	6.265	4.176	3.654	4.698	6.265	5.743	4.176	7.309
	10:23	5.743	3.132	3.132	3.654	3.132	3.132	4.698	3.654	3.654	3.654
	10:53	3.654	2.088	4.176							
	11:53	2.61	1.566	1.566	12	5.743	4.698	4.176	2.61	3.132	3.132
	12:03	4.176	4.176	5.221	6.265	5.221	6.265	6.787	8.353	10.96	16.18
	14:23	10.96	9.397	9.397	10.44	10.44	10.96	7.831	6.787	6.265	3.132
	14:53	5.221	6.787	7.309	7.831	7.309	3.132	2.61	2.61	3.132	6.787
	15:23	5.221									
	15:53	13.05	12.53	9.397	7.831	6.787	5.743	6.265	4.176	4.176	6.265
	16:23	8.353	8.875	7.309	6.787	7.309	5.743				
11/23/82	18:23	11.48	7.831	6.265	6.265	6.265	3.654	4.176	9.397	4.176	4.176
	18:53	2.61	0	0	2.61	3.132	2.088	3.654	1.044	12	OVRNGE
	19:23	30.28	30.28	30.28	30.28	49.59					
	20:23	25.06	26.62	24.01	20.36	17.22	14.61	8.875	7.309	4.698	6.787
	20:53	5.743	6.787	5.743	2.088	0	4.176	2.61	5.221	6.787	5.743
	21:23	5.743	4.698	6.265	6.787	8.353	11.48	12	13.05	12	11.48
	21:53	12	8.353	7.831	3.132	2.088	1.044	0	2.088	2.088	2.088
	22:23	0	0	0	0	2.61	6.787	5.221	2.61	8.353	2.088
	22:53	3.132	4.698	2.088	1.044	4.698	8.353	6.787	4.176	3.654	
11/24/82	00:23	5.221	1.566	1.566	2.088	1.566	.5221	.5221	.5221	1.044	1.044
	01:23	4.698	6.787	.5221	0	0	.5221	1.044	2.61	4.176	3.132
	01:53	3.654	4.176	3.132	3.132	1.566	1.566	1.566	.5221	1.044	3.132
	02:23	2.088	.5221	.5221	0	0	.5221	1.566	1.566	1.566	1.044
	02:53	1.044	1.566	.5221	2.088	1.044	1.566	1.566	2.088	0	0
	03:23	0	0	.5221	1.566	3.132	3.654	3.654	3.654	4.176	3.654
	03:53	4.698	3.654	3.654	3.654	2.61	3.132	1.566	0	1.566	1.566
	04:23	5.221	1.044	0	0	0	0	2.61	.5221	1.044	5.743
	04:53	1.044	.5221	.5221	.5221	1.044	.5221	0	0	.5221	.5221
	05:23	1.044	.5221	.5221	0	0	.5221	1.566	1.566	2.088	2.61
	05:53	2.088	3.132	1.044	5.743	.5221	4.176	.5221	0	0	.5221
	06:23	0	0	0	.5221	.5221	.5221	.5221	.5221	.5221	.5221
	06:53	.5221	.5221	0	1.044	2.088	3.132	3.132	3.132	1.566	1.566
	07:23	7.309	4.176	0	2.61	0					

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Incinerator 28

Inlet NMHC Concentrations (ppmv) at 3 min. intervals

Date of Sample	End Time of Sample										
11/12/82	20:03	4236	4801								
	20:33	937	887	796	726	695	977	2571	1210	2067	OVRNGE
	21:03	4559	OVRNGE	OVRNGE							
	22:33	2219	2824	3228	3329	3329	2824	2723	2723	3228	3631
	23:03	3430	3329	3329	2723	1916	1311	1008	907.9	907.9	403.5
11/13/82	23:33	605.3	706.1	1513	2622	3127	3127	3631	3530	3127	3026
	00:03	3530	3228	3631	3934	3631	3430	3430	3329	3732	3631
	00:33	3732	3934	3228	3329	3430	3934	3631	3732	3631	3127
	01:03	3631	3631	3732	3934	3934	3732	3934	3530	3631	3530
	01:33	3631	3833	3934	4035	3026	2017	1513	706.1	504.4	504.4
	02:03	605.3	605.3	504.4	1513	2421	2824	2824	3127	3430	3329
	02:33	2421									
	02:36	1412	1109	605.3	504.4	504.4	504.4	403.5	201.7	302.6	0
	03:06	100.8	100.8	100.8	605.3	302.6	403.5				
	03:24	6254	9483	10794	11298	11601	11803	9180	4035	2723	2017
	03:54	1916	1614	1916	2118	1715	2118	2017	2017	OVRNGE	OVRNGE
	04:24	OVRNGE	10290	11601	12408	12408	12610	12610	11904	11399	12711
	04:54	OVRNGE	OVRNGE	OVRNGE	13518	13821	10088	12812	13821	13821	OVRNGE
	05:24	OVRNGE	OVRNGE	OVRNGE	13114	13720	13921	14123	13518	8474	6153
	05:54	OVRNGE	OVRNGE	OVRNGE	OVRNGE	3430	3228	3127	3329	3631	3026
	06:24	2824	2723	2723	2219	2219	OVRNGE	OVRNGE			
	06:45	605.3	605.3	907.9	807	1008	706.1	907.9	807	1109	907.9
	07:15	907.9	807	807	807	1008	907.9	1109	1109	1109	1210
	07:45	1311	1109	1210	1109	1210	1210	1210	1109	1210	1311
	08:15	1412	1210	1008	1311	1412	1210	1210	1210	1008	1210
	08:45	1311	1008	1008	907.9	1109	1008	907.9	907.9	1008	1109
	09:15	1109	1008	907.9	1008	907.9	807	907.9	907.9	706.1	807
	09:45	1008	706.1	907.9	807	807	1008	907.9	807	605.3	706.1
	10:15	504.4	706.1	706.1	706.1	706.1	807	605.3	605.3	504.4	605.3
	10:45	807	706.1	403.5	706.1	504.4	605.3	504.4	504.4	302.6	504.4
	11:15	504.4	302.6	403.5	504.4	605.3	403.5	504.4	605.3	403.5	302.6
	11:45	605.3	302.6	403.5	504.4	403.5	302.6	302.6	403.5	403.5	
11/15/82	19:42	1101	856.8	612	367.2	489.6	0	244.8	367.2	0	0
	20:12	0	244.8	367.2	122.4	0	0	0	0	0	0
	20:42	0	244.8	2325	1101	489.6					
	21:12	2570	2570	2570	2325	2570	2325	2815	2325	2080	1958
	21:42	2203									
	21:54	0	0	0	0	0	0	0	1958	2154	
	22:30	1321	3182	3280	3378	2154	1175	685.4	244.8	244.8	195.8
	23:00	244.8	244.8	1077	1762	930.2	342.7	48.96			
	23:27	1175	1615	1909	1909	OVRNGE	OVRNGE	OVRNGE	OVRNGE	0	
11/16/82	00:30	0	0	979.2	2203	2252	1272	2594	0	685.4	2301
	01:26	538.5	1909	1321	293.7	244.8	48.96	0	0	0	0
	01:56	0	0	293.7	440.6						
	02:08	1811	2350	2399	2839	1566	2154	2399	2594	2545	2741
	02:38	2937	2937	2790	2545	2839	3084	3035	3133	3231	3133
	03:08	2790	2937	3329	3427	3427	3525	3574	3182	2301	2007
	03:38	1468	1272	979.2	587.5	538.5	342.7	293.7	293.7	244.8	293.7
	04:08	97.92	97.92	97.92	97.92	195.8	195.8	146.8	146.8	342.7	1321
	04:38	1713									
	04:41	2252	2399	2545	2643	2448	2692	2692	2937	2888	2643
	05:11	2154	2594	2692	2301	2252	2497	2448	2545	2790	2986
	05:41	3182	2203	1517	1077	881.3	734.4	391.6	440.6	342.7	1126
	06:11	1713	1860	2301	2497	2741	2986	2839	2399	2643	2497
	06:41	2888	2790	3182	2497	2692	2839	2252			
	07:02	1517	1224	1077	538.5	538.5	440.6	391.6	1126	1909	1615
	07:32	0	0	0	0	0	0	0	0	0	0
	08:02	0	0	0	0	0	0	0	0	0	
	08:30	0	0	0	12.24	0					

Incinerator 28

Date of Sample	End Time of Sample	Inlet NMHC Concentrations (ppmv) at 3 min. intervals									
11/19/82	00:23	865.9	907.2	865.9	742.2	701	494.8	742.2	618.5	536	536
	00:53	536	824.7								
	00:59	2309	2762	3092	2268	1278	1567	2845	2886	2845	3216
	01:29	3216	3216	3381	3422	3463	1773	948.4	783.5	659.8	371.1
	01:59	536	1237	2680	2969	3216	3092	3299	3381	1525	1113
	02:29	3092	4206	4536	4701	4907	4907	4907	1979	1402	1072
	02:59	742.2	701	453.6	412.3	412.3	618.5	453.6	701	1731	2433
	03:29	2886	3051	3422	2845	3134	1938	1443	1030		
	03:53	783.5	742.2	701	618.5	494.8	453.6	494.8	453.6	412.3	783.5
	04:23	1896	2515	2721	2927	3051	3340	2927	3010	3134	3175
	04:53	3299	3381	3257	3340	3092	3381	3546	3546	3587	3587
	05:23	3752	2762	3670	3958	3876	4206	3958	2391	1690	1484
	05:53	1278	948.4	1319	2474	2391	3092	3216	3546	3752	3793
	06:23	3752	3752	3422	3670	3752	3670	3793	3876	4041	2886
	06:53	2680	3216	3670	3670	4000	3010	1979	1484	2762	3257
	07:23	2969	3216	3505	3711	2804	2433	3010	3216	2639	3216
	07:53	3463	3587	3793	3835	3835	3546				
	08:55	0	288.6	453.6	453.6	453.6	453.6	2103			
	09:16	2639	3051	3216	3381	3422	2556	2226	3092	2268	2927
	09:53	3134	3340	3505	3422	3670	3010	3299	3546	3546	3628
	10:23	3711	2680	2350	3134	2804	3010	3216	3422	3546	3546
	10:53	2515	1855	2845							
	11:33	1237	907.2	494.8	2268	3299	3463	3587	3299	1979	1443
	12:03	1030	907.2	783.5	577.3	577.3	494.8	536	371.1	494.8	2103
	14:24	5443	6226	6515	5896	6721	6350	6762	7010	7175	6144
	14:54	7051	7134	7051	6927	7134	5195	4618	3216	1855	3670
	15:24	2762									
	15:53	4371	5814	6350	5402	4412	3340	1855	1030	907.2	1237
	16:23	3134	4329	4329	3793	2762	1360				
11/23/82	18:26	6096	3095	3476	3572	3715	3762	3715	OVRNGE	2381	3572
	18:56	3572	2143	3429	3619	3762	3715	3429	4000	0	OVRNGE
	19:49	3810	3857	3715	3810	2762					
	20:24	95.25	47.62	190.5	142.8	333.3	3191	3238	3333	8906	571.5
	20:54	3429	3619	3572	2714	3095	3953	3572	7382	2333	2143
	21:24	2524	3619	3095	904.9	476.2	190.5	47.62	142.8	47.62	47.62
	21:54	142.8	857.3	3572	2048	3333	3667	857.3	2524	3381	3476
	22:24	2667	2810	2952	5477	3476	5334	2095	7144	OVRNGE	714.4
	22:54	4429	2381	10297	619.1	238.1	3048	OVRNGE	2762	3381	
11/24/82	00:49	2857	2762	2[illegible]2	OVRNGE	2381	2333	2714	2905	OVRNGE	8192
	01:19	OVRNGE	OVRNGE	2762	2619	3381	2238	904.9	571.5	476.2	333.3
	01:53	285.7	11287	4810	2286	2857	2143	3524	3381	7382	OVRNGE
	02:23	3762	3715	4096	4000	2905	10001	3381	4000	4096	4048
	02:53	4286	3715	6525	3953	2286	3238	3762	4143	4143	3572
	03:23	4000	5191	9668	1476	619.1	333.3	333.3	285.7	333.3	333.3
	03:53	238.1	333.3	333.3	428.6	428.6	3143	3905	10859	11287	1952
	04:23	OVRNGE	1714	1143	2095	2619	3619	OVRNGE	10335	1190	OVRNGE
	04:53	3429	2286	3143	809.6	3381	3619	4000	4191	2333	2619
	05:23	4000	4000	3238	4238	2286	1000	619.1	523.9	381	476.2
	05:53	523.9	3905	3810	OVRNGE	3905	OVRNGE	3667	4143	4048	4334
	06:23	2952	1762	4000	4762	9382	4619	4762	5048	5143	5143
	06:53	5143	1047	2048	952.5	523.9	571.5	333.3	OVRNGE	9573	142.8
	07:23	OVRNGE	OVRNGE	1000	1143	10763					

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SECTION D.3

INCINERATOR #27 OUTLET CONCENTRATIONS

Incinerator 27

Date of Sample	End Time of Sample	Outlet THC Concentrations (ppmv) at 1 min. intervals									
11/16/82	13:03	121.6	67.1	117.4	196.2	196.2	OVRNGE				
	13:09	OVRNGE	301.9	228.5	52.42	39.84	50.32	69.2	39.84	39.84	39.84
	13:24	23.06	23.06	23.06							
	13:50	26.84	0	9.226	9.226	9.226	9.226	15.93	15.93	15.93	15.93
	14:00	15.93	15.93	15.93	20.97	15.93					
	14:05	20.97	15.93	27.68	20.97	20.97	20.13	26.84	20.13	27.68	27.68
	14:15	20.97	20.13	20.97	20.97	20.97	20.97	27.68	20.13	7.549	0
	14:25	0	0	0	0	0	0	0	20.97	20.97	20.97
	14:35	20.97	20.97	20.97	16.77	20.97	27.68	27.68	20.97	27.68	35.22
	14:45	20.13	34.39	20.97	20.97	15.93	20.13	20.13	26.84	27.68	20.97
	14:55	20.97	20.97	15.93	15.93	15.93	15.93	20.13	20.13	20.13	15.93
	15:05	20.97	20.13	20.97	15.93	20.13	15.93	15.93	20.13	19.29	17.61
	15:15	15.93	16.77	12.58	16.77	12.58	16.77	16.77	16.77	12.58	16.77
	15:25	15.09	15.09	15.09	15.09	15.09	19.29	15.09	19.29	15.09	19.29
	15:35	14.25	15.09	19.29	15.09	14.25	14.25	7.549	6.71	6.71	13.42
	15:45	12.58	13.42	11.74	15.93	5.871	10.9	14.25	18.45	18.45	14.25
	15:55	13.42	14.25	12.58	5.871	2.516	8.388	2.516	3.355		
	16:06	.8388	.8388	6.71	4.194	5.871	4.194	15.09	20.13	20.13	20.13
	16:16	15.93	20.13	20.13	15.93	15.93	15.93	20.13	15.93	20.13	15.93
	16:26	20.13	20.13	20.13	35.22	20.13	15.93	20.13	27.68	15.93	15.93
	16:36	15.93	20.13	20.97	20.13	20.13	15.93	20.97	15.93	20.13	15.93
	16:46	15.93	15.93	15.93	15.93	15.93	20.97	35.22	15.93	20.97	20.97
	16:56	27.68	15.93	15.93	20.97	15.93	15.93	15.93	20.97	20.97	20.13
	17:06	20.97	15.93	20.97	15.93	15.93	20.97	15.93	15.93	15.93	15.93
	17:16	15.93	27.68	15.93	20.97	20.97	15.93	15.93	15.93	15.93	20.97
	17:26	15.93	15.93	9.226	15.93	15.93	15.93	15.93	15.93	15.93	15.93
	17:36	15.93	15.93	20.97	15.93	15.93	10.06	OVRNGE	35.22		
	20:44	53.68	59.55	92.26	109	115.7	126.6	119.9	53.68	27.68	27.68
	20:54	20.97	15.93	15.93	15.93	15.93	15.93	15.93	15.93	15.93	15.93
	21:04	15.93	15.93	15.93	9.226	15.93	15.93	9.226	9.226	15.93	15.93
	21:14	15.93	9.226	9.226	15.93	9.226	9.226	9.226	9.226	9.226	9.226
	21:24	9.226	15.93	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE	17.61	17.61
	21:34	17.61	27.68	31.87	27.68	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE
	21:44	OVRNGE	OVRNGE	OVRNGE	20.97	20.97	20.97	20.97	20.97	15.93	20.97
	21:54	27.68	15.93	15.93	15.93	15.93	9.226	15.93	15.93	20.97	15.93
	22:04	15.93	15.93	15.93	15.93	15.93	9.226	9.226	9.226	9.226	15.93
	22:14	15.93	20.97	9.226	9.226	15.93	9.226	9.226	9.226	9.226	9.226
	22:24	15.93	15.93	9.226	15.93	15.93	15.93	8.388	9.226	15.93	8.388
	22:34	9.226	15.93	8.388	15.93	8.388	15.93	8.388	8.388	8.388	8.388
	22:44	8.388	9.226	15.93	8.388	8.388	8.388	8.388	8.388	8.388	15.93
	22:54	15.93	15.93	15.93	8.388	15.93	15.93	15.09	8.388	15.93	15.09
	23:04	15.93	8.388	15.93	15.09	15.09	20.13	8.388	8.388	15.93	15.93
	23:14	20.13	15.09	20.13	20.13	15.93	15.93	15.93	15.09	8.388	15.93
	23:24	15.93	20.13	15.09	15.09	15.93	15.93	15.93	15.09	15.09	15.93
	23:34	15.09	20.13	15.93	15.09	15.93	15.93	15.09	8.388	15.09	8.388
	23:44	8.388	15.09	15.09	15.09	8.388	15.09	8.388	15.09	15.09	8.388
	23:54	15.09	15.09	8.388	8.388	8.388	8.388	8.388	8.388	8.388	15.09
11/17/82	00:04	8.388	82.2	78	73.81	15.09	15.09	15.09	15.09	15.09	15.09
	00:14	15.09	15.09	15.09	15.09	15.09	15.09	15.09	15.09	15.09	OVRNGE
	00:24	OVRNGE	OVRNGE	169.4	178.6	178.6	14.25	14.25	14.25	14.25	7.549
	00:34	7.549	14.25	6.71	7.549	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE
	00:44	80.52	94.78	98.97	124.1	181.1	75.49	OVRNGE	OVRNGE	OVRNGE	OVRNGE
	00:54	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE					
	01:01	15.09	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE	140.9	122.4	88.91
	01:11	7.549	2.516	12.58	OVRNGE	OVRNGE	197.9	203.8	210.5	210.5	0
	01:22	6.71	170.2	193.7	133.3	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE
	01:32	OVRNGE	OVRNGE	206.3	.8388	5.871	10.9	8.388	10.06	5.871	9.226
	01:42	9.226	.8388	3.355	4.194	15.09	10.9	11.74			
	01:50	10.9	3.355	1.677	9.226	7.549	9.226	8.388	.8388	1.677	4.194
	02:00	10.9	10.9	3.355	10.9	10.9	4.194	11.74	4.194	10.9	10.9
	02:10	10.9									

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Date of Sample	End Time of Sample	Outlet THC Concentrations (ppmv) at 1 min. intervals									
11/17/82	02:14	5.871	11.74								
	02:17	5.871	12.58	5.871	12.58	5.871	5.871	11.74			
	02:25	11.74	4.194	11.74							
	02:29	4.194	10.06	0	0	0	0	3.355	2.516	.8388	0
	02:39	7.549	1.677	1.677	8.388	9.226	2.516	9.226	3.355	8.388	1.677
	02:49	2.516	1.677	3.355	4.194	4.194	4.194				
	02:56	10.06	9.226	9.226	6.71	.8388	0	5.871	9.226	5.871	1.677
	03:06	2.516	8.388	2.516	8.388	8.388	7.549				
	03:13	7.549	9.226	8.388	12.58	7.549	10.06	6.71	4.194	6.71	7.549
	03:23	10.9	2.516	0	0	0	1.677	.8388	0	0	4.194
	03:33	0	.8388	1.677	0	0	.8388	0	0	1.677	4.194
	03:43	7.549	2.516	1.677	5.871	0	0	0	0	1.677	2.516
	03:53	2.516	3.355	10.06	4.194	4.194	4.194	0	0	0	0
	04:03	0	0	3.355	0	4.194	0	1.677	.8388	5.871	0
	04:13	1.677	1.677	6.71	.8388	0	0	0	8.388	0	8.388
	04:23	6.71	.8388	7.549	1.677	1.677	6.71	0	0	5.871	5.871
	04:33	7.549	6.71	5.871	.8388	.8388	.8388	3.355	0		
	04:42	7.549	.8388	4.194	.8388	10.06	10.9	7.549	8.388	10.06	10.9
	04:52	10.9	4.194	9.226	1.677	3.355					
	04:59	4.194	3.355	4.194	4.194	10.9	4.194	4.194	3.355	4.194	3.355
	05:09	2.516	1.677	.8388	1.677	10.06					
	05:14	1.677	.8388	3.355	3.355	4.194	3.355	3.355	10.9	10.06	10.06
	05:24	7.549	9.226	4.194	3.355	3.355	4.194	9.226	10.06	10.9	4.194
	05:34	4.194	4.194								
	05:37	10.06	3.355	3.355	10.06	10.06	10.06	10.06	10.06	3.355	10.06
	05:47	9.226	10.06	3.355	.8388						
	05:52	6.71	7.549	6.71	5.871	5.871	6.71	7.549	7.549	5.871	.8388
	06:02	.8388	0	.8388	.8388	6.71	0	5.871	0	6.71	7.549
	06:12	8.388	.8388	0	4.194	4.194	10.9	10.9	10.9	10.9	11.74
	06:22	12.58	12.58	12.58	13.42	13.42	12.58	12.58	11.74	13.42	14.25
	06:32	14.25	14.25	14.25	13.42	7.549	7.549	14.25	14.25	14.25	14.25
	06:42	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25	19.29	14.25
	06:52	19.29	14.25	14.25	7.549	14.25	14.25	14.25	7.549	14.25	14.25
	07:02	7.549	15.09	14.25	15.09	14.25	14.25	14.25	7.549	14.25	14.25
	07:12	14.25	14.25	14.25	14.25	15.09	15.09	14.25	15.09	14.25	14.25
	07:22	7.549	14.25	14.25	15.09	14.25	14.25	14.25	15.09	14.25	14.25
	07:32	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25	14.25
	07:42	14.25	14.25	14.25	14.25	7.549	7.549	14.25	14.25	14.25	7.549
	07:52	14.25	14.25	14.25	13.42	14.25	14.25	14.25	13.42	12.58	5.871
	08:02	12.58	13.42	6.71	12.58	13.42	13.42	12.58	13.42	5.871	13.42
	08:12	6.71	13.42	13.42	13.42	12.58	12.58	13.42	6.71	13.42	13.42
	08:22	6.71	13.42	6.71	14.25	14.25	13.42	13.42			
	08:30	13.42	13.42	13.42	13.42	6.71	5.871	12.58	13.42	12.58	13.42
	08:40	13.42	13.42	14.25	13.42	13.42	16.77	24.32	60.39	138.4	189.5
	08:50	165.2	119.1	152.6	182	173.6	173.6	165.2	152.6	191.2	185.3
	09:00	170.2	156.8	187	179.5	176.9	143.4	124.9	167.7	199.6	185.3
11/19/82	19:16	94.79	24.41	36.62	46.67	51.7	61.04	79.71	89.76	116.3	104.1
	19:26	94.79	89.76	94.79	61.75	171.6	OVRNGE	155.1	OVRNGE	OVRNGE	OVRNGE
	19:36	171.6	OVRNGE	OVRNGE	OVRNGE	OVRNGE	OVRNGE	161.5	178	OVRNGE	OVRNGE
	19:46	OVRNGE									
	20:04	129.2	224.4	210	251.3	224.4	152.6	251.3	199.2	168.7	251.3
	20:14	307	184.9	199.2	274.6	143.6	116.6	143.6	116.6		

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Date of Sample	End Time of Sample	Outlet THC Concentrations (ppmv) at 1 min. intervals									
11/19/82	22:36	224.4	184.9	184.9	168.7	168.7	168.7	184.9	210	224.4	199.2
	22:46	236.9	260.3	199.2	224.4	290.8	199.2	168.7	236.9	152.6	168.7
	22:56	290.8	208.2	184.9	260.3	260.3	199.2	224.4	307	210	199.2
	23:06	290.8	251.3	184.9	224.4	224.4	199.2	199.2	199.2	143.6	143.6
	23:16	152.6	143.6	100.5	129.2	129.2	100.5	143.6	168.7	143.6	154.3
	23:26	236.9	168.7	168.7	224.4	224.4	168.7	199.2	260.3	143.6	116.6
	23:36	168.7	143.6	129.2	143.6	143.6	102.3	116.6	143.6	116.6	116.6
	23:46	152.6	116.6	91.56	143.6	168.7	143.6	129.2	224.4	168.7	143.6
	23:56	199.2	251.3	152.6	184.9	260.3	208.2	168.7	260.3	210	184.9
	00:06	236.9	184.9	143.6	143.6	224.4	166.9	154.3	274.6	184.9	154.3
11/20/82	00:16	199.2	152.6	154.3	260.3	184.9	168.7	251.3	236.9	184.9	154.3
	00:26	210	199.2	143.6	210	251.3	129.2	129.2	116.6	184.9	116.6
	00:36	129.2	224.4	168.7	116.6	184.9	168.7	168.7	168.7	260.3	168.7
	00:46	154.3	258.5	199.2	143.6	152.6	168.7	116.6	127.4	168.7	100.5
	00:56	143.6	184.9	129.2	116.6	274.6	152.6	143.6	224.4	236.9	154.3
	01:06	199.2	290.8	168.7	143.6	274.6	199.2	152.6	168.7	274.6	152.6
	01:16	152.6	236.9	251.3	168.7	184.9	290.8	184.9	168.7	260.3	236.9
	01:26	184.9	222.6	236.9	184.9	143.6	168.7	152.6	129.2	129.2	184.9
	01:36	143.6	143.6	184.9	251.3	184.9	152.6	260.3	184.9	154.3	224.4
	01:46	184.9	129.2	152.6	152.6	116.6	116.6	143.6	102.3	100.5	129.2
	01:56	102.3	91.56	116.6	129.2	102.3	116.6	116.6	91.56	102.3	116.6
	02:06	91.56	100.5	116.6	91.56	100.5	129.2	19.74	129.2	224.4	152.6
	02:16	129.2	222.6	152.6	129.2	168.7	251.3	152.6	152.6	260.3	183.1
	02:26	152.6	260.3	222.6	168.7	236.9	290.8	184.9	184.9	199.2	152.6
	02:36	154.3	260.3	199.2	199.2	251.3	210	168.7	222.6	251.3	199.2
	02:46	184.9	290.8	199.2	184.9	208.2	152.6	166.9	251.3	184.9	166.9
	02:56	251.3	236.9	168.7	224.4	274.6	210	199.2	251.3	199.2	152.6
	03:06	168.7	143.6	143.6	224.4	199.2	152.6	224.4	260.3	184.9	199.2
	03:16	290.8	184.9	184.9	307	224.4	152.6	199.2	166.9	143.6	235.1
	03:26	208.2	166.9	199.2	274.6	184.9	184.9	274.6	199.2	168.7	258.5
	03:36	224.4	184.9	208.2	168.7	152.6	222.6	210	168.7	184.9	251.3
	03:46	166.9	143.6	152.6	143.6	116.6	129.2	152.6	102.3	102.3	143.6
	03:56	116.6	91.56	116.6	116.6	77.19	102.3	116.6	91.56	100.5	129.2
	04:06	91.56	91.56	129.2	100.5	77.19	129.2	116.6	77.19	102.3	116.6
	04:16	77.19	91.56	116.6	102.3	91.56	129.2	199.2	152.6	129.2	224.4
	04:26	152.6	143.6	251.3	152.6	129.2	208.2	236.9	152.6	168.7	290.8
	04:36	199.2	143.6	260.3	184.9	152.6	251.3	199.2	143.6	208.2	152.6
	04:46	129.2	210	258.5	168.7	168.7	260.3	184.9	152.6	274.6	208.2
	04:56	168.7	210	251.3	184.9	143.6	168.7	199.2	199.2	184.9	184.9
	05:06	222.6	199.2	199.2	210	224.4	199.2	184.9	251.3	199.2	184.9
	05:16	199.2	184.9	184.9	251.3	199.2	168.7	251.3	236.9	184.9	236.9
	05:26	260.3	199.2	208.2	236.9	224.4	184.9	168.7	236.9	224.4	166.9
	05:36	249.5	236.9	199.2	208.2	274.6	184.9	184.9	274.6	235.1	168.7
	05:46	236.9	208.2	129.2	143.6	168.7	129.2	143.6			
	05:53	143.6	116.6	100.5	129.2	116.6	91.56	116.6	116.6	91.56	100.5
	06:03	129.2	116.6	91.56	61.04	77.19	61.04	61.04	61.04	59.24	61.04
	06:13	59.24	61.04	61.04	75.4	77.19	75.4	77.19	102.3	102.3	91.56
	06:23	91.56	91.56	91.56	91.56	100.5	100.5	127.4	143.6	199.2	184.9
	06:33	224.4	199.2	184.9	168.7	184.9	152.6	152.6	141.8	129.2	116.6
	06:43	100.5	91.56	91.56	61.04	77.19	61.04	61.04	44.88	44.88	61.04
	06:53	44.88	35.9	35.9	35.9	35.9	35.9	35.9	35.9	35.9	35.9
	07:03	44.88	35.9	35.9	35.9	44.88	35.9	44.88	35.9	44.88	59.24
	07:13	44.88	61.04	59.24	44.88	61.04	44.88	44.88			

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Date of Sample	End Time of Sample	Outlet THC Concentrations (ppmv) at 1 min. intervals									
11/22/82	07:12	232	OVRNGE	325.2	114.2	362.2	195.1	149.4	114.2	203.9	253.1
	07:22	337.5	195.1	165.2	325.2	195.1	126.5	203.9	203.9	126.5	253.1
	07:32	395.6	175.8	272.5	420.2	218	218	OVRNGE	203.9	181.1	420.2
	07:42	244.4	114.2	OVRNGE	302.4	235.6	309.4	395.6	181.1	218	163.5
	07:52	114.2	165.2	267.2	163.5	165.2	395.6	218	218	298.9	298.9
	08:02	195.1	230.3	378	195.1	181.1	OVRNGE	253.1	218	203.9	298.9
	08:12	230.3	195.1	309.4	165.2	165.2	244.4	163.5	218	362.2	195.1
	08:22	195.1	325.2								
	11:43	98.46	154.7	154.7	130.1	225	70.33	70.33	130.1	98.46	70.33
	11:53	98.46	98.46	52.74	70.33	98.46	52.74	52.74	98.46	70.33	52.74
	12:03	98.46	70.33	52.74	70.33	98.46	52.74	70.33	98.46	52.74	52.74
	12:13	98.46	70.33	52.74	98.46	70.33	52.74	98.46	130.1	154.7	
	12:22	158.2	225	200.4	175.8	253.1	200.4	70.33	200.4	172.3	154.7
	12:32	225	221.5	172.3	200.4	295.3	172.3	249.6	298.9	221.5	172.3
	12:42	172.3	200.4	154.7	221.5	249.6	221.5	200.4	200.4	295.3	172.3
	12:52	172.3	327	218	172.3	221.5	323.5	94.94	172.3	200.4	168.7
	13:02	225	298.9	221.5	225	298.9	200.4	200.4	253.1	249.6	200.4
	13:12	175.8	270.7	154.7	172.3	221.5	225	249.6	200.4	298.9	200.4
	13:22	200.4	253.1	200.4	225	225	270.7				
	13:37	72.09	121.3	121.3	56.26	94.94	110.7	56.26	86.15.	121.3	56.26
	13:47	72.09	110.7	72.09	56.26	110.7	137.1	189.8	198.6	291.8	212.7
	13:57	212.7	260.2	212.7	212.7	160	274.2	225	212.7	290.1	272.5
	14:07	212.7	246.1	328.8	225	246.1	300.6	212.7	237.3	288.3	221.5
	14:17	172.3	193.4	198.6	219.7	221.5	210.9	267.2	230.3	198.6	230.3
	14:27	295.3	186.3	209.2	267.2	135.3	175.8	196.9	207.4	184.6	240.8
	14:37	209.2	198.6	251.4	293.6	228.5	198.6	279.5	219.7	219.7	198.6
	14:47	228.5	194.6	205.7	305.9	196.9	226.8	239.1	251.4	207.4	184.6
	14:57	332.3	124.8	184.6	261.9	195.1	100.2	277.8	209.2	210.9	223.3
	15:07	328.8	210.9	228.5	281.3	209.2	228.5	240.8	297.1	198.6	198.6
	15:17	228.5	198.6	184.6	184.6	277.8	184.6	196.9	263.7	225	205.7
	15:27	218	305.9	225	225	302.4	145.9	172.3	216.2	193.4	181.1
	15:37	288.3	246.1	216.2	247.9	332.3	225	223.3	290.1	233.8	205.7
	15:47	145.9	233.8	182.8	193.4	272.5	223.3	203.9	223.3	288.3	203.9
	15:57	193.4	318.2	214.5	221.5	261.9	182.8	161.7	195.1	216.2	216.2
	16:07	195.1	216.2	195.1	223.3	203.9	203.9	203.9	193.4	203.9	202.2
	16:17	107.2	193.4	170.5	181.1	219.7	144.1	96.7	73.84	61.54	31.64
	16:27	61.54	96.7	59.78	31.64	45.71	45.71	29.89	31.64	284.8	156.4
	16:37	170.5	281.3	210.9	189.8	210.9	325.2	179.3	105.4	230.3	82.63
	16:47	107.2	189.8	170.5	191.6	265.5	244.4	189.8	244.4	314.7	219.7
	16:57	221.5	316.4	214.5	191.6	191.6	221.5	191.6	193.4	318.2	214.5
	17:07	214.5	260.2	270.7	193.4	193.4	328.8	214.5	203.9	269	174
	17:17	174	218	184.6	184.6	86.15	77.36	47.47	47.47	63.29	110.7
	17:27	175.8	175.8	249.6	216.2	182.8	174	174	86.15	75.6	77.36
	17:37	77.36	109	86.15	123	47.47	63.29	109	63.29	47.47	124.8
	17:47	63.29	49.23	100.2	86.15	35.16	100.2	86.15	36.92	151.2	179.3
	17:57	167	210.9	283	89.67	179.3	210.9	188.1	188.1	281.3	188.1
	18:07	212.7	300.6	225	212.7	233.8	283	212.7	202.2	244.4	225
	18:17	188.1	233.8	376.2	202.2	233.8	376.2	189.8	189.8	330.5	212.7
	18:27	212.7	358.6	114.2	189.8	258.4	181.1	202.2	332.3	214.5	233.8
	18:37	258.4	272.5	202.2	226.8	342.8	212.7	202.2	342.8	181.1	189.8
	18:47	212.7	214.5	212.7	246.1	246.1	214.5	260.2	332.3	202.2	202.2
	18:57	328.8	230.3	209.2	198.6	253.1	221.5	221.5	337.5	221.5	228.5
	19:07	265.5	290.1	223.3	225	341.1	232	225	312.9	179.3	202.2
	19:17	202.2	223.3	225	242.6	256.7	232	240.8	230.3	230.3	254.9
	19:27	209.2	242.6	228.5	151.2	244.4	223.3	188.1	328.8	225	200.4
	19:37	283	341.1	200.4	233.8	341.1	212.7	200.4	281.3	179.3	202.2
	19:47	225	242.6								

Incinerator 27

Date of Sample	End Time of Sample	Outlet THC Concentrations (ppmv) at 1 min. intervals									
11/22/82	20:52	274.3	337.6	404.7	368.3	291.5	322.2	276.2	322.2	291.5	354.8
	21:02	276.2	324.1	260.8	120.8	352.9	291.5	324.1	291.5	404.7	354.8
	21:12	303	322.2	301.1	335.7	322.2	301.1	291.5	260.8	145.7	335.7
	21:22	274.3	337.6	299.2	366.3	276.2	352.9	364.4	299.2	318.4	120.8
	21:32	245.5	134.2	84.4	109.3	145.7	67.14	84.4	136.1	92.07	51.79
	21:42	67.14	118.9	69.05	82.48	82.48	82.48	82.48	92.07	107.4	67.14
	21:52	67.14	118.9	197.5	268.5	283.9	211	174.5	253.2	253.2	280
	22:02	281.9	293.4	268.5	268.5	281.9	268.5	253.2	264.7	349.1	283.9
	22:12	118.9	212.9	318.4	318.4	299.2	460.3	331.8	299.2	299.2	379.8
	22:22	316.5	283.9	174.5	134.2	132.3	211	241.7	187.9	209	220.6
	22:32	232.1	264.7	310.7	239.7	232.1	310.7	253.2	266.6	280	345.2
	22:42	253.2	255.1	222.5	281.9	222.5	266.6	345.2	280	253.2	237.8
	22:52	326.1	237.8	264.7	289.6	354.8	262.8	264.7	237.8	262.8	237.8
	23:02	218.6	205.2	191.8	84.4	109.3	161.1	69.05	84.4	138.1	84.4
	23:12	69.05	120.8	109.3	69.05	93.99	161.1	226.3	239.7	289.6	274.3
	23:22	239.7	247.4	352.9	258.9	247.4	318.4	287.7	120.8	285.8	245.5
	23:32	245.5	268.5	360.6	281.9	253.2	328	291.5	237.8	237.8	375.9
	23:42	249.3	287.7	184.1	245.5	235.9	228.2	245.5	343.3	239.7	253.2
	23:52	347.2	295.4	255.1	253.2	314.6	243.6	253.2	243.6	222.5	174.5
	00:02	214.8	222.5	255.1	257	245.5	243.6	316.5	235.9	243.6	331.8
11/23/82	00:12	318.4	245.5	257	220.6	187.9	234	234	241.7	278.1	253.2
	00:22	241.7	280	268.5	241.7	266.6	322.2	237.8	264.7	262.8	251.2
	00:32	187.9	232.1	241.7	241.7	241.7	237.8	237.8	260.8	272.3	243.6
	00:42	258.9	232.1	270.4	239.7	140	224.4	257	272.3	237.8	420.1
	00:52	241.7	270.4	318.4	316.5	247.4	247.4	352.9	276.2	258.9	147.7
	01:02	316.5	247.4	262.8	274.3	385.5	258.9	289.6	291.5	272.3	289.6
	01:12	247.4	333.7	237.8	274.3	199.5	272.3	226.3	249.3	260.8	337.6
	01:22	276.2	274.3	241.7	109.3	93.99	107.4	239.7	199.5	120.8	226.3
	01:32	191.8	93.99	93.99	145.7	69.05	69.05	136.1	84.4	69.05	109.3
	01:42	109.3	53.71	90.15	120.8	67.14	69.05	136.1	80.56	51.79	117
	01:52	109.3	51.79	191.8	201.4	228.2	249.3	226.3	178.4	201.4	239.7
	02:02	272.3	258.9	258.9	247.4	318.4	224.4	224.4	329.9	243.6	234
	02:12	270.4	234	157.3	224.4	211	234	281.9	220.6	235.9	253.2
	02:22	283.9	257	243.6	295.4	243.6	255.1	199.5	222.5	212.9	234
	02:32	243.6	314.6	222.5	235.9	293.4	270.4	268.5	222.5	134.2	92.07
	02:42	134.2	212.9	224.4	235.9	212.9	189.9	201.4	255.1	245.5	270.4
	02:52	257	257	297.3	255.1	266.6	283.9	328	268.5	253.2	283.9
	03:02	172.6	195.6	211	220.6	241.7	293.4	234	243.6	312.6	295.4
	03:12	266.6	283.9	316.5	255.1	253.2	197.5	253.2	234	251.2	280
	03:22	293.4	249.3	241.7	328	251.2	253.2	328	291.5	264.7	251.2
	03:32	241.7	170.7	90.15	103.5	130.4	92.07	80.56	118.9	90.15	67.14
	03:42	107.4	105.5	67.14	92.07	117	67.14	67.14	134.2	82.48	49.87
	03:52	107.4	92.07	51.79	93.99	105.5	51.79	82.48	134.2	69.05	67.14
	04:02	118.9	82.48	51.79	92.07	107.4	178.4	212.9	257	224.4	237.8
	04:12	270.4	285.8	222.5	245.5	297.3	235.9	237.8	272.3	272.3	120.8
	04:22	258.9	237.8	237.8	260.8	352.9	249.3	239.7	320.3	274.3	239.7
	04:32	260.8	366.3	239.7	201.4	239.7	260.8	239.7	260.8	383.6	258.9
	04:42	247.4	303	335.7	239.7	249.3	320.3	258.9	249.3	226.3	239.7
	04:52	214.8	226.3	237.8	354.8	237.8	260.8	320.3	258.9	260.8	260.8
	05:02	352.9	247.4	257	176.4	136.1	84.4	193.7	239.7	214.8	239.7
	05:12	335.7	249.3	260.8	354.8	276.2	249.3	241.7	337.6	276.2	249.3
	05:22	203.3	260.8	216.7	228.2	337.6	276.2	260.8	249.3	356.8	260.8
	05:32	247.4	226.3	216.7	93.99	84.4	136.1	84.4	69.05	109.3	109.3
	05:42	51.79	84.4	120.8	53.71	70.97	120.8	69.05	53.71	122.7	93.99
	05:52	53.71	84.4	122.7	51.79	69.05	138.1	163	241.7	241.7	291.5

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Incinerator 27

Date of Sample	End Time of Sample	Outlet THC Concentrations (ppmv) at 12 min. intervals									
11/22/82	09:43	87.91	196.9	253.1	228.5	196.9	249.6	298.9	196.9	221.5	189.8
11/23/82	06:18	274.5	219.2	293.4	227.8	334.9	210.6	310.7	326.3		

Incinerator 27

Date of Sample	End Time of Sample	Outlet CO Concentrations (ppmv) at 12 min. intervals									
11/22/82	09:43	0	21.7	18.8	24.59	21.7	0	19.89	9.042	18.08	0
11/24/82	06:18	9.249	15.19	2.312	15.19	6.276	11.89	10.9	10.24		

SECTION D.4

INCINERATOR #28 OUTLET CONCENTRATIONS

Incinerator 28

Outlet THC Concentrations (ppmv) at 1 min. intervals

Date of Sample	End Time of Sample				Date of Sample	End Time of Sample			
11/12/82					11/13/82				
	20:03	253	284	256		00:48	218	258	258
	20:06	284	297	272		00:51	245	218	245
	20:09	83.7	83.7	66.1		00:54	258	258	258
	20:12	66.1	83.7	66.1		00:57	227	218	227
	20:15	66.1	83.7	48.6		01:00	218	227	218
	20:18	83.7	48.6	66.1		01:03	245	218	218
	20:21	66.1	66.1	48.6		01:06	218	258	258
	20:24	38.9	48.6	48.6		01:09	258	258	245
	20:27	66.1	99.2	128		01:12	245	218	218
	20:30	140	140	167		01:15	216	210	202
	20:33	200	216	243		01:18	179	159	190
	21:00	218	155	142		01:21	255	206	223
	21:03	167	167	128		01:24	260	206	218
	21:06	140	155	167		01:27	218	218	206
	21:09	182	218	237		01:30	216	214	242
	22:33	99.2	110	99.2		01:33	260	227	223
	22:36	99.2	128	110		01:36	227	198	233
	22:39	140	140	126		01:39	214	251	256
	22:42	128	140	167		01:42	229	218	260
	22:45	182	200	140		01:45	233	216	200
	22:48	182	140	140		01:48	190	186	132
	22:51	167	140	128		01:51	198	149	132
	22:54	182	128	155		01:54	107	134	124
	22:57	167	167	140		01:57	149	85.6	64.2
	23:00	155	167	200		02:00	72	34.9	40.9
	23:03	167	155	182		02:03	19.4	99.2	44.7
	23:06	218	218	200		02:06	73.9	70	99.2
	23:09	167	182	200		02:09	72	72	48.6
	23:12	182	155	167		02:12	75.9	89.5	68.1
	23:15	182	167	110		02:15	73.9	122	124
	23:18	110	99.2	83.7		02:18	151	134	177
	23:21	110	110	83.7		02:21	159	175	173
	23:24	126	110	110		02:24	190	218	190
	23:27	126	110	83.7		02:27	190	157	157
	23:30	83.7	66.1	66.1		02:30	218	190	208
	23:33	83.7	110	66.1		02:33	208	206	187
	23:36	66.1	66.1	83.7		02:36	161	151	134
	23:39	83.7	140	110		02:39	134	122	134
	23:42	128	167	128		02:42	105	120	120
	23:45	167	140	155		02:45	93.4	103	93.4
	23:48	140	140	155		02:48	103	77.8	93.4
	23:51	167	167	167		02:51	120	93.4	77.8
	23:54	218	167	167		02:54	77.8	103	77.8
	23:57	200	155	200		02:57	58.4	77.8	103
11/13/82	00:00	182	167	202		03:00	75.9	93.4	75.9
	00:03	202	182	202		03:03	75.9	75.9	91.4
	00:06	202	218	218		03:06	56.4	91.4	56.4
	00:09	182	202	218		03:09	58.4	58.4	77.8
	00:12	218	227	245		03:12	79.8	62.2	79.8
	00:15	182	182	218		03:15	95.3	62.2	79.8
	00:18	227	218	218		03:18	60.3	62.2	60.3
	00:21	202	182	182		03:21	60.3	60.3	77.8
	00:24	167	218	218		03:24	60.3	60.3	105
	00:27	218	218	182		03:27	77.8	77.8	134
	00:30	202	182	245		03:30	151	177	210
	00:33	202	227	202		03:33	237	251	311
	00:36	202	227	218		03:36	293	311	309
	00:39	245	245	202		03:39	336	327	365
	00:42	227	202	202		03:42	383	352	352
	00:45	202	202	218		03:45	352	290	313

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Outlet THC Concentrations (ppmv) at 1 min. intervals

Date of Sample	End Time of Sample			
11/13/82	03:48	247	218	206
	03:51	173	155	155
	03:54	144	116	114
	03:57	116	116	89.5
	04:00	144	114	97.3
	04:03	112	110	91.4
	04:06	89.5	99.2	99.2
	04:09	89.5	73.9	99.2
	04:12	89.5	116	99.2
	04:15	105	122	122
	04:18	496	496	496
	04:21	496	496	496
	04:24	496	496	494
	04:27	255	241	214
	04:30	280	280	342
	04:33	313	330	371
	04:36	358	340	340
	04:39	389	358	389
	04:42	416	340	358
	04:45	340	369	387
	04:48	369	387	369
	04:51	387	387	397
	04:54	490	492	492
	04:57	494	494	494
	05:00	488	492	490
	05:03	449	397	449
	05:06	397	449	397
	05:09	414	449	432
	05:12	397	385	387
	05:15	434	432	432
	05:18	414	414	476
	05:21	496	496	496
	05:24	492	494	490
	05:27	490	490	492
	05:30	492	492	488
	05:33	410	430	383
	05:36	395	457	475
	05:39	459	432	475
	05:42	459	459	459
	05:45	432	412	447
	05:48	354	327	292
	05:51	292	276	276
	05:54	494	494	494
	05:57	496	494	496
	06:00	496	496	494
	06:03	496	496	496
	06:06	151	177	161
	06:09	136	179	161
	06:12	161	161	122
	06:15	161	161	159
	06:18	159	214	214
	06:21	212	196	239
	06:24	268	196	196
	06:27	196	221	196
	06:30	212	196	212
	06:33	177	161	177
	06:36	161	149	151
	06:39	494	496	494
	06:42	494	494	496
	06:45	120	120	147

Date of Sample	End Time of Sample			
11/13/82	06:48	146	130	130
	06:51	128	87.6	114
	06:54	112	112	112
	06:57	110	68.1	83.7
	07:00	83.7	83.7	46.7
	07:03	64.2	46.7	46.7
	07:06	46.7	79.8	64.2
	07:09	46.7	29.2	89.5
	07:12	29.2	44.7	42.8
	07:15	60.3	42.8	42.8
	07:18	42.8	27.2	42.8
	07:21	247	317	216
	07:24	188	155	110
	07:27	128	81.7	99.2
	07:30	96.4	99.2	81.7
	07:33	83.7	38.9	99.5
	07:36	36.9	38.9	72
	07:39	38.9	72	70
	07:42	97.3	72	70
	07:45	36.9	36.9	54.5
	07:48	72	72	81.7
	07:51	56.4	38.9	72
	07:54	56.4	38.9	81.7
	07:57	81.7	97.3	97.3
	08:00	97.3	81.7	56.4
	08:03	56.4	81.7	38.9
	08:06	81.7	38.9	72
	08:09	21.4	72	54.5
	08:12	70	81.7	81.7
	08:15	70	70	70
	08:18	70	54.5	35
	08:21	19.4	35	36.9
	08:24	70	36.9	35
	08:27	70	36.9	54.5
	08:30	70	54.5	19.4
	08:33	36.9	19.4	19.4
	08:36	35	17.5	52.5
	08:39	35	17.5	17.5
	08:42	17.5	17.5	17.5
	08:45	50.6	17.5	23.3
	08:48	23.3	58.4	58.4
	08:51	58.4	13.6	13.6
	08:54	23.3	23.3	23.3
	08:57	38.9	40.8	13.6
	09:00	25.3	25.3	15.5
	09:03	38.9	38.9	56.4
	09:06	38.9	38.9	21.4
	09:09	40.8	29.2	73.9
	09:12	29.2	56.4	40.8
	09:15	29.2	73.9	40.8
	09:18	29.2	13.6	29.2
	09:21	29.2	56.4	73.9
	09:24	29.2	40.8	13.6
	09:27	27.2	29.2	29.2
	09:30	35	33	33
	09:33	33	44.7	44.7
	09:36	33	33	44.7
	09:39	60.3	17.5	44.7
	09:42	44.7	44.7	33
	09:45	60.3	33	17.5

Incinerator 28

Outlet THC Concentrations (ppmv) at 1 min. intervals

Date of Sample	End Time of Sample			
11/13/82	09:48	33	33	33
	09:51	60.3	17.5	33
	09:54	60.3	33	33
	09:57	33	33	60.3
	10:00	17.5	17.5	33
	10:03	33	33	17.5
	10:06	60.3	60.3	60.3
	10:09	33	33	33
	10:12	77.8	44.7	17.5
	10:15	17.5	44.7	44.7
	10:18	17.5	33	17.5
	10:21	33	44.7	33
	10:24	77.8	17.5	44.7
	10:27	77.8	17.5	17.5
	10:30	17.5	33	44.7
	10:33	60.3	58.4	15.5
	10:36	15.5	58.4	42.8
	10:39	42.8	31.1	58.4
	10:42	42.8	40.8	42.8
	10:45	40.8	15.5	40.8
	10:48	15.5	31.1	42.8
	10:51	31.1	31.1	31.1
	10:54	42.8	31.1	40.8
	10:57	58.4	40.8	40.8
	11:00	40.8	15.5	40.8
	11:03	31.1	40.8	40.8
	11:06	58.4	15.5	42.8
	11:09	40.8	58.4	31.1
	11:12	31.1	40.8	13.6
	11:15	31.1	31.1	31.1
	11:18	15.5	58.4	15.5
	11:21	31.1	58.4	58.4
	11:24	58.4	31.1	31.1
	11:27	15.5	31.1	31.1
	11:30	40.8	31.1	40.8
	11:33	58.4	31.1	31.1
	11:36	31.1	15.5	31.1
	11:39	58.4	31.1	42.8
	11:42	42.8	31.1	31.1
	11:45	31.1	58.4	31.1
	11:48	31.1	42.8	15.5
	11:51	31.1	58.4	58.4
	11:54	298	233	206
	11:57	155	128	116
	12:00	116	99.5	38.9
	12:03	38.9	99.2	36.9
	12:06	87.6	27.2	72
	12:09	54.5	27.2	27.2
11/15/82	19:42	39.8	33	39.8
	19:45	27.6	27.6	20.1
	19:48	20.1	26.8	27.6
	19:51	27.6	27.6	20.1
	19:54	26.8	20.1	20.1
	19:57	20.1	20.1	20.1
	20:00	20.1	20.1	20.1
	20:03	20.1	20.5	20.5
	20:06	11.5	11.5	10.4

Date of Sample	End Time of Sample			
11/15/82	20:09	11.5	11.5	10.4
	20:12	10.4	10.2	10.4
	20:15	10.4	10.4	11.5
	20:18	10.4	10.4	11.5
	20:21	10.4	10.4	10.4
	20:24	10.4	10.4	10.4
	20:27	10.4	8.59	10.4
	20:30	10.4	8.59	10.4
	20:33	10.4	10.4	10.4
	20:36	10.4	10.4	10.4
	20:39	10.4	10.4	11.5
	20:42	10.4	10.4	8.59
	20:45	10.4	10.4	10.4
	20:48	10.4	10.4	10.4
	20:51	10.4	8.59	8.59
	21:09	4.19	98.5	98.5
	21:12	88.4	88.4	88.4
	21:15	96.4	98.5	88.4
	21:18	88.4	95.9	92.6
	21:21	95.9	95.9	85
	21:24	77.9	88.4	84.6
	21:27	82.1	84.6	82.1
	21:30	84.6	88.4	92.2
	21:33	98.5	84.6	98
	21:36	84.6	102	84.6
	21:39	88.4	75.4	75.8
	21:42	77.9	92.2	92.6
	21:54	13.4	20.1	20.5
	21:55	17.1	17.1	14.6
	21:57	12.9	13.8	17.1
	21:58	16.7	17.1	17.1
	21:59	20.1	20.5	20.5
	22:01	20.5	20.1	20.1
	22:03	20.5	25.9	20.5
	22:15	7.54	34.3	34.3
	22:16	37.7	25.9	32.2
	22:30	12.9	106	106
	22:33	106	106	104
	22:36	104	98.5	104
	22:39	106	104	104
	22:42	98.5	98.5	104
	22:45	104	106	106
	22:48	106	106	104
	22:51	106	96.4	102
	22:54	96.4	92.6	92.6
	22:57	75.8	70.8	70.8
	23:00	58.6	58.2	50.2
	23:03	53.2	52.8	41.4
	23:06	41	44.8	47.3
	23:09	44.8	61.1	58.2
	23:12	57.8	61.1	54.9
	23:15	47.3	50.7	47.7
	23:19	44.4	47.7	44.4
11/16/82	00:47	2.93	0	.419
	00:50	23.4	36	39.4
	00:57	39.8	32.6	40.2
	01:02	81.3	50.3	56.1
	01:05	62	56.1	53.7
	01:08	53.6	72.1	50.3
	01:11	-8.6	60.3	41

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Outlet THC Concentrations (ppmv) at 1 min. intervals

Date of Sample	End Time of Sample			
11/16/82	01:14	25.9	63.7	77.9
	01:17	80.5	51.1	25.9
	01:20	55.3	57.8	54.5
	01:23	33.2	69.6	80.5
	01:26	14.2	5.87	46.9
	01:29	79.6	22.6	77.1
	01:32	66.2	72.1	69.6
	01:35	72.1	53.6	44.4
	01:38	15	67	51.1
	01:41	57.8	54.5	47.8
	01:44	51.1	32.7	35.2
	01:47	25.9	25.9	22.6
	01:50	18.4	23.4	28.5
	01:53	6.7	27.6	20.1
	01:56	19.2	20.1	17.6
	01:59	23.4	10	17.6
	02:02	21.8	43.6	29.3
	02:05	31.8	43.6	39.4
	02:08	63.7	55.3	67
	02:11	62	61.2	77.9
	02:14	83.8	83.8	83.8
	02:17	94.7	93.9	88.9
	02:20	83.8	73.8	77.9
	02:23	53.6	92.2	93
	02:26	81.3	83	92.2
	02:29	97.2	82.1	73.4
	02:32	83.5	86.3	92.2
	02:35	103	106	91.4
	02:38	102	105	104
	02:41	109	94.7	109
	02:44	94.7	94.7	88.9
	02:47	101	100	85.5
	02:50	85.5	88.9	89.7
	02:53	90.5	97.2	109
	02:56	10	91.4	112
	02:59	102	113	87.2
	03:02	87.2	103	109
	03:05	92.2	90.5	98.1
	03:08	110	91.4	109
	03:11	110	109	110
	03:14	119	110	93
	03:17	120	103	99.8
	03:20	110	99.8	121
	03:23	115	100	111
	03:26	112	116	116
	03:29	129	116	116
	03:32	113	100	89.7
	03:35	83	73.4	68.7
	03:38	64.5	68.7	68.7
	03:41	57	57	64.5
	03:44	63.7	51.9	68.7
	03:47	51.9	40.2	45.2
	03:50	45.2	57.8	33.5
	03:53	40.2	57.8	33.5
	03:56	25.9	34.3	51.9
	03:59	33.5	34.3	45.2
	04:02	45.2	34.3	25.9
	04:05	26.8	26.8	25.9
	04:08	45.2	25.9	41
	04:11	41	41	19.2

Date of Sample	End Time of Sample			
11/16/82	04:14	41	41	41
	04:17	34.3	26.8	26.8
	04:20	26.8	34.3	26.8
	04:23	41	26.8	41
	04:26	26.8	26.8	26.8
	04:29	33.5	41	33.5
	04:32	19.2	41	33.5
	04:35	34.3	45.2	33.5
	04:38	41	41	51.9
	04:41	57.8	51.9	51.9
	04:44	64.5	51.9	52.8
	04:47	51.9	64.5	57.8
	04:50	51.9	57.8	57.8
	04:53	68.7	52.8	68.7
	04:56	68.7	69.6	57
	04:59	75.4	64.5	68.7
	05:02	57.8	76.3	73.4
	05:05	83.8	76.3	83.8
	05:08	118	106	101
	05:11	69.6	75.4	64.5
	05:14	76.3	75.4	64.5
	05:17	64.5	83	76.3
	05:20	51.9	51.9	64.5
	05:23	64.5	57.8	64.5
	05:26	64.5	64.5	68.7
	05:29	68.7	69.6	68.7
	05:32	68.7	69.6	75.4
	05:35	68.7	68.7	83.8
	05:38	69.6	75.4	68.7
	05:41	76.3	89.7	90.5
	05:44	76.3	75.4	69.6
	05:47	64.5	57.8	52.8
	05:50	52.8	51.9	45.2
	05:53	41	51.9	45.2
	05:56	41	41	41
	05:59	33.5	34.3	34.3
	06:02	51.9	26.8	33.5
	06:05	40.2	41	45.2
	06:08	26.8	45.2	45.2
	06:11	41	51.9	45.2
	06:14	45.2	45.2	41
	06:17	57.8	57	64.5
	06:20	57.8	51.9	68.7
	06:23	57.8	64.5	51.9
	06:26	64.5	57.8	68.7
	06:29	83	90.5	64.5
	06:32	83	68.7	75.4
	06:35	57.8	76.3	75.4
	06:38	57.8	68.7	57
	06:41	68.7	83	63.7
	06:44	83	89.7	57
	06:47	89.7	75.4	156
	06:50	106	93.9	93.9
	06:53	89.7	75.4	83
	06:56	64.5	63.7	68.7
	06:59	63.7	51.9	68.7
	07:02	40.2	40.2	57
	07:05	51.9	51.9	40.2
	07:08	40.2	33.5	45.2
	07:11	33.5	33.5	25.9

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Outlet THC Concentrations (ppmv) at 1 min. intervals

Date of Sample	End Time of Sample				Date of Sample	End Time of Sample			
11/16/82	07:14	19.2	19.2	19.2	11/16/82	07:59	0	0	0
	07:17	40.2	19.2	25.9		08:02	0	20.9	13.4
	07:20	33.5	40.2	40.2		08:05	3.35	[illegible]	4.19
	07:23	33.5	25.9	44.4		08:08	3.35	0	0
	07:26	40.2	40.2	44.4		08:11	0	0	0
	07:29	44.4	40.2	40.2		08:14	0	0	0
	07:32	43.6	43.6	17.6		08:17	15	10	3.35
	07:35	21.8	10	0		08:20	2.51	3.35	0
	07:38	0	0	10		08:23	7.54	8.38	3.35
	07:41	11.7	0	0		08:26	1.67	0	0
	07:44	0	0	0		08:30	0	0	18
	07:47	0	0	0		08:32	10.9	13.8	11.3
	07:50	1.67	0	0		08:35	13.8	18.8	20.3
	07:53	0	0	0		08:38	19	14.7	12.1
	07:56	0	0	0		08:41	9.22	7.14	.419

11/19/82	00:15	40.93	47.39	57.45	51.7	67.5	51.7	67.5	58.16	58.16	61.75
	00:30	51.7	47.39	37.34	47.39	40.93	37.34	47.39	30.87	40.93	24.41
	00:40	40.93	40.93	24.41	37.34	24.41	40.93	40.93	30.87	30.87	24.41
	00:50	37.34	24.41	37.34	24.41	24.41	37.34	30.87			
	00:57	51.7	47.39	61.75	51.7	67.5	74.68	61.75	68.22	80.43	61.75
	01:07	47.39	58.16	67.5	51.7	51.7	58.16	51.7	40.93	51.7	51.7
	01:17	58.16	74.68	74.68	61.75	51.7	58.16	61.75	61.75	74.68	74.68
	01:27	80.43	67.5	74.68	67.5	67.5	84.02	80.43	90.48	80.43	67.5
	01:37	84.02	84.02	80.43	74.68	80.43	95.51	68.22	61.75	58.16	47.39
	01:47	37.34	30.87	24.41	24.41	30.87	24.41	30.87	37.34	30.87	37.34
	01:57	30.87	30.87	24.41	24.41	37.34	37.34	51.7	58.16	58.16	58.16
	02:07	58.16	74.68	74.68	74.68	80.43	80.43	61.75	74.68	61.75	74.68
	02:17	80.43	74.68	74.68	67.5	67.5	58.16	51.7	40.93	47.39	40.93
	02:27	30.87	61.75	84.02	90.48	95.51	104.8	104.8	110.5	101.2	101.2
	02:37	123.5	123.5	123.5	123.5	134.2	117.7	127.8	117.7	110.5	127.8
	02:47	123.5	84.02	67.5	51.7	47.39	51.7	40.93	37.34	40.93	47.39
	02:57	37.34	40.93	37.34	30.87	40.93	40.93	18.67	18.67	18.67	14.36
	03:07	18.67	18.67	14.36	14.36	14.36	14.36	18.67	14.36	18.67	18.67
	03:17	18.67	18.67	24.41	30.87	14.36	24.41	30.87	37.34	51.7	40.93
	03:27	40.93	61.75	51.7	47.39	40.93	40.93	47.39	51.7	51.7	61.75
	03:37	74.68	67.5	61.75	74.68	61.75	80.43	67.5	67.5	61.75	61.75
	03:47	40.93	30.87	47.39	40.93						
	03:51	40.93	40.93	37.34	24.41	30.87	37.34	37.34	24.41	30.87	24.41
	04:01	24.41	40.93	18.67	18.67	37.34	18.67	18.67	18.67	24.41	37.34
	04:11	24.41	24.41	18.67	24.41	24.41	24.41	18.67	18.67	18.67	18.67
	04:21	24.41	30.87	37.34	40.93	47.39	40.93	47.39	58.16	68.22	51.7
	04:31	61.75	58.16	80.43	68.22	67.5	61.75	84.02	80.43	80.43	74.68
	04:41	61.75	67.5	58.16	61.75	61.75	61.75	58.16	68.22	58.16	67.5
	04:51	61.75	58.16	67.5	61.75	68.22	74.68	67.5	74.68	74.68	61.75
	05:01	84.02	68.22	61.75	74.68	61.75	61.75	61.75	61.75	84.02	51.7
	05:11	74.68	80.43	61.75	74.68	67.5	74.68	67.5	80.43	74.68	80.43
	05:21	67.5	80.43	67.5	67.5	68.22	84.02	58.16	68.22	80.43	80.43
	05:31	95.51	101.2	84.02	90.48	84.02	89.76	90.48	90.48	90.48	80.43
	05:41	95.51	84.02	80.43	68.22	61.75	74.68	74.68	58.16	58.16	51.7
	05:51	51.7	40.93	47.39	37.34	40.93	40.93	37.34	40.93	37.34	47.39
	06:01	47.39	58.16	51.7	58.16	51.7	58.16	51.7	61.75	74.68	58.16
	06:11	67.5	67.5	68.22	67.5	74.68	74.68	80.43	80.43	74.68	67.5
	06:21	74.68	74.68	74.68	90.48	90.48	95.51	84.02	74.68	67.5	74.68
	06:31	67.5	67.5	74.68	74.68	90.48	74.68	80.43	80.43	90.48	74.68
	06:41	74.68	74.68	90.48	84.02	84.02	95.51	84.02	80.43	80.43	80.43
	06:51	61.75	67.5	58.16	58.16	67.5	74.68	67.5	80.43	67.5	80.43

Incinerator 28

Outlet THC Concentrations (ppmv) at 1 min. intervals

Date of Sample	End Time of Sample										
11/19/82	07:01	67.5	84.02	74.68	80.43	84.02	80.43	84.02	80.43	80.43	67.5
	07:11	68.22	58.16	51.7	47.39	58.16	47.39	51.7	58.16	74.68	61.75
	07:21	58.16	51.7	67.5	51.7	74.68	58.16	74.68	74.68	61.75	67.5
	07:31	58.16	61.75	61.75	80.43	74.68	67.5	58.16	58.16	47.39	58.16
	07:41	67.5	61.75	61.75	61.75	58.16	67.5	80.43	61.75	67.5	58.16
	07:51	74.68	67.5	68.22	58.16	84.02	80.43	67.5	84.02	74.68	67.5
	08:01	61.75	67.5	74.68	84.02	74.68	84.02	74.68	74.68		
	14:22	99.82	99.82	99.82	94.07	114.9	99.82	108.4	94.07	108.4	102.6
	14:32	94.07	99.1	102.6	108.4	99.1	88.33	35.9	78.99	93.35	98.38
	14:43	93.35	101.9	101.9	88.33	99.1	88.33	88.33	107.7	87.61	99.1
	14:52	89.04	99.1	89.04	99.82	93.35	73.24	66.78	89.04	89.04	88.33
	15:02	94.07	94.07	94.07	89.04	99.82	104.8	82.58	89.04	94.07	99.1
	15:12	94.07	73.24	50.98	46.67	40.21	36.62	46.67	36.62	40.21	40.21
	15:22	46.67	40.21	30.16							
	15:51	30.87	40.21	57.45	73.24	89.04	78.99	83.3	89.04	89.04	94.07
	16:01	109.1	83.3	46.67	46.67	36.62	30.87	23.69	24.41	23.69	24.41
	16:11	23.69	17.95	17.95	23.69	23.69	23.69	23.69	17.95	23.69	23.69
	16:21	17.95	17.95	46.67	61.04	57.45	67.5	67.5	73.96	79.71	67.5
	16:31	40.93	46.67	36.62	24.41	24.41	30.87	17.95	17.95		
11/23/82	18:24	197.5	395.1	368.3	354.8	385.5	412.4	385.5	395.1	412.4	354.8
	18:34	412.4	354.8	368.3	431.6	412.4	368.3	354.8	412.4	395.1	395.1
	18:44	383.6	368.3	107.4	383.6	464.2	464.2	412.4	446.9	412.4	412.4
	18:54	385.5	395.1	237.8	429.6	458.4	431.6	368.3	383.6	383.6	368.3
	19:04	395.1	354.8	395.1	368.3	395.1	395.1	354.8	354.8	368.3	326.1
	19:14	97.83	97.83	276.2	276.2	251.2	105.5	21.1	381.7	481.4	OVRNGE
	19:46	OVRNGE									
	19:48	387.4	387.4	418.1	299.2	418.1	387.4	352.9	418.1	322.2	418.1
	19:57	318.4	38.36	38.36	38.36	38.36					
	20:22	211	191.8	191.8	191.8	211	211	211	191.8	191.8	211
	20:32	211	211	211	211	211	211	211	211	211	211
	20:42	211	211	211	211	211	211	211	211	211	211
	20:52	211	211	211	211	211	211	211	211	211	191.8
	21:02	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8
	21:12	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8
	21:22	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8
	21:32	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8
	21:42	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8
	21:52	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8	191.8
	22:02	191.8	191.8	191.8	191.8	172.6	172.6	172.6	172.6	172.6	172.6
	22:12	172.6	172.6	172.6	172.6	172.6	172.6	172.6	172.6	172.6	172.6
	22:22	172.6	172.6	172.6	172.6	172.6	172.6	172.6	172.6	172.6	172.6
	22:32	172.6	172.6	172.6	153.4	153.4	153.4	153.4	153.4	134.2	134.2
	22:42	134.2	134.2	134.2	134.2	115	115	306.9	306.9	306.9	115
	22:52	115	134.2	134.2	134.2	134.2	134.2	134.2	134.2	134.2	134.2
	23:02	153.4	153.4	153.4	153.4	153.4	153.4	153.4	153.4	153.4	153.4
	23:12	306.9	306.9	326.1	153.4	134.2	172.6	172.6			

Incinerator 28

Outlet THC Concentrations (ppmv) at 1 min. intervals

Date of Sample	End Time of Sample										
	00:47	399	452.7	399	433.5	399	364.4	364.4	433.5	134.2	333.7
11/24/82	00:57	433.5	345.2	375.9	414.3	452.7	399	364.4	364.4	364.4	452.7
	01:07	452.7	333.7	452.7	134.2	333.7	433.5	437.3	172.6	372.1	487.2
	01:17	333.7	333.7	456.5	379.8	383.6	487.2	445	445	483.4	364.4
	01:27	399	433.5	452.7	399	80.56	46.03	46.03	46.03	80.56	46.03
	01:37	46.03	46.03	46.03	80.56	80.56	46.03	46.03	46.03	46.03	46.03
	01:50	46.03	46.03	46.03	46.03	80.56	222.5	218.6	80.56	364.4	399
	02:00	399	333.7	433.5	364.4	253.2	168.8	510.2	483.4	433.5	452.7
	02:10	429.6	452.7	364.4	310.7	483.4	134.2	280	310.7	168.8	364.4
	02:20	379.8	379.8	349.1	364.4	399	333.7	399	364.4	399	429.6
	02:30	364.4	310.7	399	399	199.5	253.2	222.5	222.5	452.7	364.4
	02:40	364.4	333.7	452.7	399	399	399	433.5	333.7	399	433.5
	02:50	452.7	399	364.4	399	429.6	280	364.4	222.5	280	399
	03:00	333.7	399	399	364.4	168.8	134.2	333.7	333.7	399	364.4
	03:10	364.4	452.7	364.4	452.7	452.7	399	364.4	333.7	429.6	364.4
	03:20	429.6	310.7	333.7	199.5	168.8	222.5	280	253.2	310.7	76.73
	03:30	46.03	46.03	46.03	46.03	46.03	46.03	46.03	46.03	46.03	46.03
	03:40	46.03	46.03	46.03	80.56	46.03	46.03	46.03	46.03	46.03	46.03
	03:50	46.03	46.03	46.03	46.03	46.03	46.03	46.03	46.03	46.03	46.03
	04:00	46.03	80.56	46.03	46.03	46.03	168.8	222.5	222.5	310.7	364.4
	04:10	399	199.5	99.75	253.2	364.4	253.2	452.7	99.75	80.56	46.03
	04:20	80.56	99.75	222.5	299.2	299.2	272.3	429.6	364.4	364.4	399
	04:30	280	310.7	429.6	399	433.5	483.4	399	399	399	280
	04:40	399	498.7	253.2	314.6	333.7	364.4	310.7	80.56	310.7	280
	04:50	379.8	402.8	402.8	253.2	399	333.7	452.7	364.4	222.5	134.2
	05:00	429.6	429.6	364.4	364.4	333.7	399	433.5	433.5	333.7	433.5
	05:10	364.4	333.7	433.5	399	364.4	399	134.2	222.5	364.4	399
	05:20	399	399	399	429.6	333.7	364.4	134.2	433.5	433.5	452.7
	05:30	364.4	329.9	80.56	46.03	46.03	46.03	46.03	46.03	46.03	46.03
	05:40	46.03	46.03	46.03	46.03	46.03	46.03	46.03	46.03	80.56	46.03
	05:50	46.03	46.03	46.03	253.2	280	333.7	280	364.4	364.4	364.4
	06:00	199.5	364.4	544.7	437.3	402.8	199.5	222.5	452.7	379.8	552.4
	06:10	452.7	399	429.6	433.5	364.4	364.4	399	452.7	452.7	333.7
	06:20	433.5	399	433.5	333.7	364.4	168.8	399	399	433.5	452.7
	06:30	399	364.4	399	364.4	99.75	510.2	452.7	399	364.4	364.4
	06:40	364.4	364.4	310.7	364.4	399	399	333.7	364.4	433.5	433.5
	06:50	452.7	310.7	399	99.75	433.5	429.6	80.56	46.03	46.03	46.03
	07:00	46.03	46.03	46.03	46.03	46.03	46.03	46.03	46.03	46.03	46.03
	07:10	46.03	46.03	80.56	310.7	253.2	99.75	218.6	46.03	399	280
	07:20	80.56	310.7	168.8	164.9	456.5	138.1	80.56	80.56	80.56	46.03
	07:30	218.6	168.8	253.2	80.56	399	452.7				

Incinerator 28

Date of Sample	End Time of Sample	Outlet THC Concentrations (ppmv) at 12 min. intervals							
11/15/82	23:36	28.5							
	23:57	106							
11/19/82	09:35	75.4	61.75	90.48	61.75	84.02	47.39	84.02	40.93
	11:42	37.34	79.71	24.41	14.36	14.36			

Incinerator 28

Date of Sample	End Time of Sample	Outlet CO Concentrations (ppmv) at 12 min. intervals							
11/15/82	23:36	0							
	23:57	22.7							
11/19/82	09:35	2.508	3.225	2.867	2.15	3.225	3.942	2.867	0
	11:42	2.007	5.017	.0716	0	.0716			

APPENDIX E

GC RESULTS

The results of GC analyses for incinerators 27 and 28 are presented in Tables E-1 through E-4. Based on GC/MS results, compound identifications were assigned to some of the peaks in samples from incinerator 27. This was not done for incinerator 28 because the GC/MS results did not identify any peaks in the C_1 to C_6.

TABLE E-1. RESULTS OF HYDROCARBON SPECIATION FOR INCINERATOR #27 - INLET

		Method 18 Concentration (ppmv C_1)[a]								
Date	Time	C_1	C_2	C_3	C_4	C_5	C_6	C_7	Σ Other C_6^+	THC
11/19/82	1958	ND	ND	ND	133	181	354	ND	3360	4028
11/19/82	2038	81.9	19.7	10.6	125	149	417	ND	3220	4023
11/19/82	2125	75.9	18.7	6.99[b]	129	200	405	ND	3800	4636
11/22/82	0840	64.8	ND	ND	ND	51.6	17.6	NA	329	463
11/22/82	0910	82.8	ND	ND	72.9	128	247	NA	3110	3640
11/22/82	1010	81.6	ND	ND	72.9	129	271	NA	3390	3950
11/22/82	1305	89.7	ND	13.1	86.4	139	429	NA	5660	6420
11/22/82	1328	78.3	ND	ND	71.1	139	294	NA	3480	4060
11/22/82	1350	41.7	ND	ND	74.1	84.9	250	321	2300	3070
11/22/82	1430	64.2	ND	ND	67.2	109	288	399	2100	3030
11/22/82	1512	102	ND	ND	63.6	131	291	399	2060	3040
11/22/82	1656	81.6	ND	ND	53.1.	120	296	453	2100	3110

[a] ppmv = parts per million by volume quanitated against propane.

[b] At or below detection limit.

[c] None detected. Detection limit was 8.5 ppmv on 11/19/82 and 17 ppmv on 11/22/82.

[d] Not available. Any C_7 is included in Σ $C6^+$ values.

TABLE E-2. RESULTS OF HYDROCARBON SPECIATION FOR INCINERATOR #27 - OUTLET

		Method 18 Concentration (ppmv C_1)[a]								
Date	Time	C_1	C_2	C_3	C_4	C_5	C_6	C_7	Σ Other C_6^+	THC
11/22/82	1040	197	29.7	19.2	5.13	13.4	4.26	12.8	32.4	315
11/22/82	1110	77.1	25.4	21.2	10.6	19.4	6.42	10.7	17.1	188
11/22/82	1230	133	24.5	14.8	8.55	13.5	10.8	10.8	17.0	233
11/22/82	1737	79.5	28.1	1.85	ND[b]	4.41	ND	ND	ND	114
11/22/82	1821	138	25.7	16.2	9.39	10.7	ND	ND[c]	426	627
11/22/82	1900	224	28.3	14.3	5.37	9.03	ND	NA	273	555
11/22/82	1930	67.2	25.2	20.1	13.0	22.9	ND	10.7	336	495

[a] ppmv = parts per million by volume quanitated against propane.
[b] None detected. Detection limit = 0.75 ppmv C_1.
[c] Not available. Any C_7 is included with other Σ C_6^+ value.

TABLE E-3. RESULTS OF HYDROCARBON SPECIATION FOR INCINERATOR #28 - INLET

Date	Time	Method 18 Concentration (ppmv Cl)[a] C_1	C_2	C_3	C_4	C_5	C_6	C_7	Σ Other C_6^+	THC
11/12/82	1305	39.0	2.43[b]	ND[c]	ND	9.3[b]	91.2	NA	121	263[e]
11/12/82	1400	28.8	ND	ND	ND	10.9[b]	97.8	NA[d]	125	263[e]
11/12/82	1900	33.0	2.28[b]	1.92[b]	ND	32.7	145	NA[d]	3620	3830
11/12/82	2018	27.6	ND	ND	ND	ND	ND	NA	3120	3150
11/15/82	2103	40.8	ND	ND	ND	9.36[b]	56.1	25.6	2660	2790
11/15/82	2225	35.1	ND	ND	ND	14.5	582	42.0	4580	5250
11/16/82	0015	41.1	ND	ND	ND	6.60	57.3	46.8	3360	3510
11/17/82	1627	45.0	ND	ND	ND	14.9	ND	119	ND	298[e]
11/17/82	1708	50.1	ND	2340 (C_3^+)						2390
11/17/82	1723	48.3	ND	ND	ND	15.1	ND	115	921	1100
11/18/82	2045	34.8	ND	ND	273	46.2	34.8	27.8	10300	10700
11/18/82	2200	39.3	ND	ND	34.8	36.0	20.6	51.9	474	657
11/18/82	2254	22.4	ND	ND	43.5	19.6	ND	NA	2460	2540
11/19/82	0840	31.8	ND	ND	ND	4.11[b]	17.1	NA	213	266
11/19/82	1130	46.2	ND	ND	ND	8.7[b]	210	50.7	3560	3880
11/19/82	1230	42.3	8.64[b]	ND	ND	10.1[b]	420	NA	3410	3890
11/19/82	1410	18.2	ND[b]	ND	ND	7.86[b]	110	NA	5590	5720
11/19/82	1435	33.6	10.4[b]	ND	ND	10.2[b]	152	NA	6600	6800
11/19/82	1537	23.3	ND	ND	ND	5.85[b]	146	NA	4780	4950
11/23/82	1951	29.6	ND	ND	ND	ND	95.4	1630	9620	11400
11/23/82	2325	22.7	ND	ND	ND	ND	52.2	468	8120	8670
11/23/82	2355	30.9	ND	ND	ND	ND	74.1	1490	5440	7040

[a] ppmv = parts per million by volume.
[b] At or below detection limit.
[c] None detected. Detection limit for 11/12/82 = 8.2 ppmv, for 11/15, 11/16 and 11/19/82 = 8.5 ppmv, for 11/17 and 11/18/82 = 8.0 ppmv, for 11/23/82 = 16.0 ppmv.
[d] Not available. Any C_7 is included in Σ C_6^+ value.
[e] No backflush made for these samples.

TABLE E-4. RESULTS OF HYDROCARBON SPECIATION FOR INCINERATOR #28 - OUTLET

Date	Time	Method 18 Concentration (ppmv C_1)[a]								
		C_1	C_2	C_3	C_4	C_5	C_6	C_7	Σ Other C_6+	THC
11/12/82	0937	b	b	22.7	ND[c]	31.5	73.5	149	205	480
11/12/82	1015	18.0	ND	23.0	ND	10.5	ND	77.5	210	339
11/12/82	1120	25.5	ND	20.1	ND	9.36	ND	66.3	ND	118
11/12/82	1300	18.2	6.33	19.4	ND	7.74	ND	78.6	71.7	202
11/12/82	1355	15.9	6.66	16.5	ND	7.74	ND	70.4	30.4	148
11/17/82	1627[d]	2.19	4.23	1.89	ND	ND	0.57	ND	ND	8.88
11/17/82	1708[d]	1.83	1.17	0.24	0.09 C_4+					3.33
11/17/82	1723[d]	2.25	2.97	2.79	ND	ND	ND	ND	ND	8.01
11/18/82	1915	9.60	1.41[d]	1.26	ND	ND	ND	ND	ND	12.3
11/18/82	2045	28.0	3.00	6.03	3.21	ND	ND	ND	ND	40.3
11/18/82	2200	11.1	1.35	3.15	ND	ND	ND	ND	ND	15.6
11/18/82	2254	12.8	1.83	3.57	ND	ND	3.09	ND	ND	21.3
11/19/82	0840	13.5	1.20	1.89	ND	ND	5.16	ND	ND	21.8
11/19/82	1130	13.5	1.92	4.05	0.15[d]	ND	ND	ND	ND	19.6
11/19/82	1537	4.53	1.71	6.33	2.52	7.23	ND	ND	ND	22.3
11/23/82	1754	30.9	8.70	ND	ND	ND	ND	39.3	ND	78.9
11/23/82	1842	39.0	2.28	4.20	ND	ND	ND	28.7	31.8	106
11/23/82	1914	39.3	18.6	ND	ND	ND	ND	NA[e]	60.6	119
11/24/82	0042	31.2	7.59	ND	ND	ND	ND	22.7	ND	61.5
11/24/82	0118	32.4	9.09	ND	189 (C_4+)					230

TABLE E-4. (CONTINUED) RESULTS OF HYDROCARBON SPECIATION FOR INCINERATOR #28 - OUTLET

		Method 18 Concentration (ppmv C_1)[a]								
Date	Time	C_1	C_2	C_3	C_4	C_5	C_6	C_7	Σ Other C_6^+	THC
11/24/82	0135	26.0	6.42	ND	ND	ND	ND	NA	279	312

[a] ppmv = parts per million by volume quanitated against propane.

[b] Not available.

[c] None detected. For 11/12 detection limit = 1.0 ppmv, 11/17-11/19 detection limit = 0.1 ppmv for 11/23 and 11/24 detection limit = -.75 ppmv.

[d] At or below detection limit.

[e] Data collected during unsteady process operation.

APPENDIX F

RESULTS OF MOLECULAR WEIGHT DETERMINATIONS

The results of fixed gas analyses and molecular weight determinations are shown in Tables F-1 through F-4. Data in these tables include results for inlet and outlet gas streams for incinerators 27 and 28. The results shown in Tables F-1 through F-4 have been normalized to give CO_2, O_2 and N_2 concentrations that sum to 100 percent.

TABLE F-1. RESULTS OF FIXED GAS ANALYSIS OF INLET 28

Date	Time	Concentration (%) CO_2	O_2	N_2	Dry Molecular Weight
11/12/82	2153	0.64	20.9	78.5	28.9
11/16/82	0020	0.26	21.3	78.5	28.9
11/17/82	1705	0.41	21.2	78.4	28.9
11/17/82	1715	0.33	21.0	78.7	28.9
11/18/82	2107	0.64	21.6	77.7	28.9
11/18/82	2115	0.49	21.8	77.7	28.9
11/23/82	1955	1.12	20.3	78.5	29.0
11/23/82	2000	0.71	20.7	78.6	28.9
11/23/82	2335	0.79	20.2	79.0	28.9
11/24/82	0023	0.98	20.5	78.6	29.0

TABLE F-2. RESULTS OF FIXED GAS ANALYSIS OF OUTLET 28

Date	Time	Concentration (%) CO_2	O_2	N_2	Dry Molecular Weight
11/12/82	1400	1.76	19.2	79.0	29.0
11/12/82	2015	1.70	18.9	79.4	29.0
11/12/82	2115	1.90	18.9	79.2	29.1
11/15/82	2103	1.48	19.9	78.6	29.0
11/15/82	2152	1.07	20.2	78.7	29.0
11/17/82	1625	0.16*	21.9	78.0	28.9
11/17/82	1642	ND	21.3	78.7	28.9
11/17/82	1700	ND	21.9	78.1	28.9
11/18/82	1912	0.97	20.3	78.7	29.0
11/18/82	1923	1.21	20.2	78.6	29.0
11/18/82	2032	1.25	19.9	78.9	29.0
11/18/82	2050	1.78	20.0	78.3	29.1
11/18/82	2155	0.67	19.9	79.4	28.9
11/19/82	0836	1.05	20.0	79.0	29.0
11/19/82	0847	1.41	20.2	78.2	29.0
11/19/82	1415	1.33	18.1	80.5	28.9
11/19/82	1120	1.32	18.8	79.9	29.0
11/23/82	1758	1.68	18.6	79.7	29.0
11/23/82	1858	2.57	18.0	79.4	29.1
11/24/82	0042	2.34	18.8	78.8	29.1
11/24/82	0053	2.74	17.8	79.5	29.2

*At or below detection level
ND = Not detected. Detection level = 0.1%

TABLE F-3. RESULTS OF FIXED GAS ANALYSIS OF INLET 27

Date	Time	Concentration (%) CO_2	O_2	N_2	Dry Molecular Weight
11/19/82	1957	0.63	21.6	77.8	29.0
11/22/82	0950	1.41	20.0	78.6	29.0
11/22/82	0955	1.34	20.0	78.7	29.0
11/22/82	1010	1.33	19.9	78.8	29.0
11/22/82	1310	1.19	20.3	78.5	29.0
11/22/82	1317	1.24	20.0	78.8	29.0
11/22/83	1325	1.40	20.3	78.3	29.0

TABLE F-4. RESULTS OF FIXED GAS ANALYSIS OF OUTLET 27

Date	Time	Concentration (%) CO_2	O_2	N_2	Dry Molecular Weight
11/19/82	2038	0.14*	22.0	77.8	28.9
11/19/82	2123	0.10*	21.9	78.0	28.9
11/22/82	1050	2.66	17.9	79.4	29.1
11/22/82	1100	2.60	18.2	79.2	29.1
11/22/82	1105	2.47	18.4	79.1	29.1
11/22/82	1115	2.32	18.3	79.4	29.1
11/22/82	1120	2.45	18.2	79.4	29.1
11/22/82	1128	2.54	18.2	79.2	29.1

*At or below detection limit (detection limit = 0.1%).

APPENDIX G

GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS) RESULTS

The results of GC/MS analyses for incinerators 27 and 28 are presented in Table G-1. The method used to analyze the GC/MS samples was intented primarily for species identification and the concentrations of the different components presented in Table G-1 are only approximate. However, these concentrations can be used to determine the relative amounts of the various components as presented in Section 5.3.2.

TABLE G-1. GC/MS RESULTS FOR CANISTER SAMPLES COLLECTED AT PLANT C-1 (Concentrations are as ppmv of each compound quantitated against toluene.)

Compound	Inlet 27 Sample 1[a]	Outlet 27 Sample 1	Outlet 27 Sample 2	Inlet 28[b]	Outlet 28
Methylene chloride		11[c]			0.44
Acetone	9.3		23		
Carbon disulfide					0.90
Trichlorofluoromethane					2.90
Cyclopropane		4.5			
Butene					1.0
2-Methyl propene		2.7			
2-Methyl butane	3.6		12		
Methyl isobutyl ketone			36		
Pentane		8.1	28		
2-Methyl pentane			4.5		
Methyl cyclopentane			5.8		
Methyl ethyl pentane			4.9		
Dimethyl pentane	5.3	0.82	8.9		
Hexane		1.5	13		
Methyl cyclohexane			5.0		
Heptane					0.39
Methylene heptane	4.8				
Dimethyl ethyl pentane	9.0				
Octane					0.34
Dimethyl octane ($C_{10}H_{22}$)					0.70
$C_7H_{16}O_2$ hydrocarbon	23				
C_9 hydrocarbon	11				
C_{10} hydrocarbon	9.8	1.6			
Benzene	18	5.3	5.8		1.5
Toluene	99	22	9.4	60	2.3
m/p-Xylenes	34	20	6.9	133	1.4
o-Xylenes		1.8	3.4	96	1.6
Ethylbenzene	17	3.0		42	0.39
n-propylbenzene				54	0.54
i-propylbenzene				42	0.70
Methyl ethyl benzenes				285	3.2
Trimethylbenzenes				150	2.1
1,4-Diethylbenzene				18	0.25

[a]Plant down during some of the sample collection time. Values, therefore, do not reflect accurate concentrations.

[b]Values given represent the average of duplicate determinations of a single sample.

[c]Probable laboratory or sampling contaminant. Not included in calculations for % of THC table.